MODEL AIRPLANE NEWS

11th Year of Publication

JUNE, 1940

20c

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Beautiful big 4 ft. Class D soaring glider with unusual pod-shaped fuselage and cylindrical tail boom. Designed along the lines of the Baby "Bowlus". Excellent flights when either tow line or hand launched. Be sure to build it. Complete Kit E-5018, only..... **50c**

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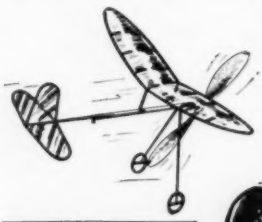

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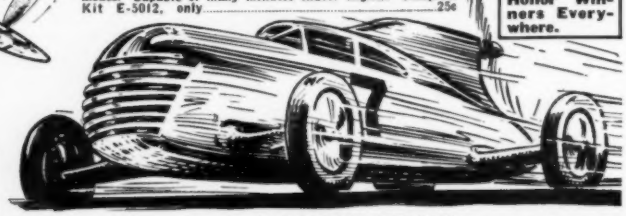
Cleveland Models Are Prize And Honor Winners Everywhere.



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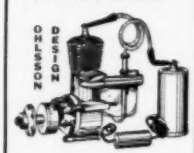
Curtiss (Goshawk) F11C-2 Fighter

Kit D-49 Span 15¾"..... 85c
Kit SE-49 Span 23⅞"..... $2.50

Contest Motors



For CLASS A

Mighty Atom..... $12.50
New Ohlsson "19" 14.50

For CLASS B

Ohlsson "23"..... $16.50
The new "Brownie" $7.50

For CLASS C

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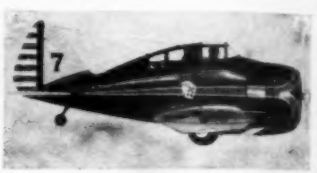
Brown, Jr. Model D.... 12.50
Brown, Jr. Model C.... 18.50
Brown, Jr. Model B.... 21.50
Dennymite Standard..... 15.85
Dennymite DeLuxe..... 17.85
Ohlsson "Custom 60".... 21.50
(Mention upright or inverted)



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Kit D-61 Span 16"..... 85c
Kit SF-61 Span 24"..... $2.25

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"B" Class

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Model illustrated is Playboy Sr. which can also be made into cabin type model.

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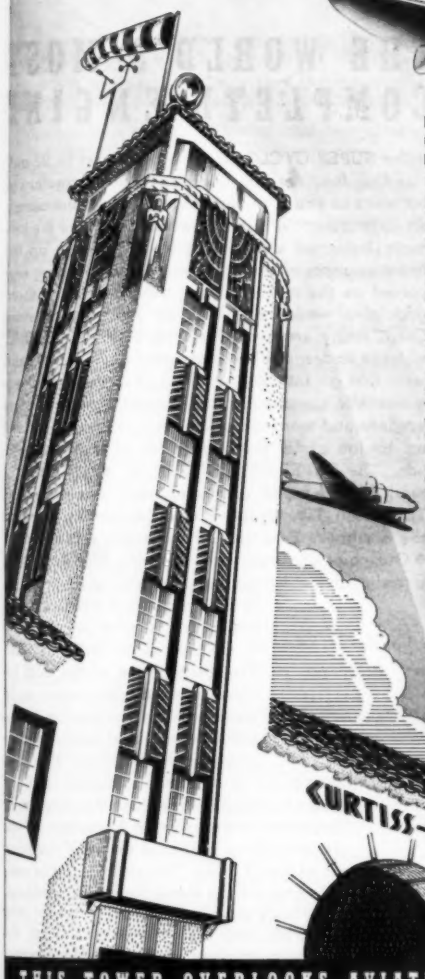
ZOOM into Aviation



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THE "G" SERIES

SUPER-

Inside Facts . . .

We are the pioneers of the Rotary Crankshaft Admission Valve for miniature engines and introduced it to the model engine world. When adapted to a new engine, there are certain characteristics encountered in the design of this valve that we alone understand for its perfect and unequalled operation.

Its advantages over the side port designed engines are:

1—A larger and lighter crankshaft.

2—Ample size main bearing journal, due to the tubular port construction.

3—Main bearing is constantly oiled because of port location, either in upright or inverted position.

4—The rotary crank with integral port allows an absolute port timing for the admission of the gas mixture into the crank case.

5—The instant the correct semi-vacuum is created in the crank case by the up-stroke of the piston, the valve port on the journal is uncovered. The port is held open all during the proper duration of the piston travel. At the instant the partial vacuum ceases in the crank case and the piston is on the downward stroke (correct amount of overlap allowed) the port is closed.

6—Blow-back is eliminated as described in number 5 and a maximum amount of engine efficiency is gained in relation to piston displacement.

In the side port, or third port engine design, the designer must strike a happy medium to curtail blow-back. This must be obtained by starving the entrance of the fuel to the crank case on the upward stroke of the piston to take care of the excessive amount of piston over-lap created on the down stroke. With this method, the engine is operating under an insufficient amount of fuel mixture, causing inefficiency as to power out-put per cubic inch displacement. Our crank shafts are made in one piece and are machined all over from solid bar stock. This tough alloy steel has characteristics of and compares favorably with S.A.E. 3140. After machining, the main journal, cam shoulder and propeller end are ground between centers to a very close tolerance of .0001 inch for absolute concentricity and roundness.

NOTICE Watch for the announcement of our new .10 c. c. SUPER-CYCLONE "G-R" SERIES race car and speed boat engine! The SUPER-CYCLONE "G" SERIES is especially designed for peak performance with model airplanes and is intended exclusively for this purpose. Our engineers have proven that race car and airplane engines are two distinct power plants and have perfected each to meet its own particular requirements.

THE WORLD'S MOST COMPLETE ENGINE

is the SUPER-CYCLONE, as a glance at its 32 outstanding features will tell you. But of greater importance to you is the fact that these are not merely an aggregation of "talking points"; they are the perfectly balanced elements that go to make up the finest example of miniature engine engineering ever placed on the market at any price. Some of these principles were originated by Aircraft Industries Corp., many are exclusive with SUPER-CYCLONE, all have undergone the same rigid development and tests that go into the building of large aircraft engines. We are pioneers in the building of miniature engines and were one of the first to produce and sell an engine under precision mass production methods. The SUPER-CYCLONE is the direct result of working with model planes, engines, etc., since 1915. Think of it! Twenty-five years of experience behind the designer. Few indeed can make this claim.

• Our chief engineer and designer, Mel Anderson, introduced the hollow rotary crank shaft principle to the miniature field and has brought it to its peak efficiency in the new SUPER-CYCLONE. The introduction of the dual ignition system gives more rapid and complete combustion, hence more power, and causes easier and quicker starting. The contact points of our real miniature ignition timer can actually be adjusted to the proper clearance. It has always been one of our precision shop practices to make cylinders and pistons as individually lapped units. Our aluminum Die castings are of unusual density and are the finest the world produces.

• MORE HORSEPOWER—Using exactly the same propeller with all engines, SUPER-CYCLONE was tested against four of the most popular and well-known engines in the 1/5 Horsepower Class—SUPER-CYCLONE turned up over 1000 R.P.M. more than any other engine!

• When you buy SUPER-CYCLONE you are not taking any chances. Aircraft Industries Corp. is an old, reliable organization with the record of manufacturing thousands of engines, a personnel of experts and a company policy of honest and TRUTHFUL advertising. You save from $10 to $15 (the usual dealers' commission) on SUPER-CYCLONE as a result of buying direct from the manufacturer, whose production methods and tremendous volume of sales permit them to offer you the world's greatest value. BUY SUPER-CYCLONE AND WITH THE DIFFERENCE PURCHASE ANY CLASS "C" KIT ADVERTISED IN THIS MAGAZINE!

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MINIATURE ENGINEERING

CYCLONE

NO OTHER ENGINE CAN MATCH THIS LIST OF SUPER-CYCLONE FEATURES

1. Most thoroughly designed and finest appearing engine on the market.
2. Rotary crank shaft admission valve.
3. One piece crank shaft, crank pin and counterweight integral, machined all over.
4. Full advance and retard ignition timer, the finest ever developed on any miniature engine.
5. Plunger lock or ignition timer.
6. Supercharged down draft carburetion, utilizing propeller air blast.
7. Twin spark—more power—easier starting.
8. Heavy duty ball bearing thrust with hardened steel races.
9. Hardened steel cam with non-slip prop drive.
10. Transparent fuel tank with large approved snap cover filler.
11. Suction gas feed, either upright or inverted.
12. 7/16" diameter main bearing of finest bearing metal obtainable.
13. Finest aluminum die castings the world affords.
14. Super light weight lapped in piston of special construction.
15. Positive ratchet lock on needle valve.
16. Correctly designed and proportioned flywheel with integral slotted drive, washer and nut included—$1.25 each.
17. H sectioned aluminum alloy con rod with oversized bronze bearing inserts, bushed both ends.
18. Tubular hardened and ground full floating wrist pin.
19. Crank case has fins for air-cooling and appearance.
20. Removable exhaust stack.
21. No leaky clamp-on or screwed-on port covers.
22. Serviceable aircraft steel engine mounts for fire wall installation.
23. Screws and parts cadmium and nickel plated.
24. Six conversions to choose from.
25. Either dual or single ignition.
26. Upright models can be changed to inverted, or vice versa, without additional parts.
27. Cylinder may be turned 180 degrees for either right or left exhaust.
28. Needle valve seat may be changed to either side.
29. Timer assembly 180 degrees reversible—easy to get at spark lever.
30. Comes all mounted and wired ready to install.
31. Manufactured by an old established aircraft concern.
32. SUPER-CYCLONE will fly any kit now on the market—WITH POWER TO SPARE—yet light enough for small jobs.

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☐ ***Baby Cyclone*** America's most popular engine for sport flying. Price will advance shortly to $12.50. ..... $9.00

☐ Steel Mounting Brackets 50c

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Model AIRPLANE News

11th YEAR OF PUBLICATION

VOL. XXII *No. 6*

Edited by Charles Hampson Grant

CONTENTS

JUNE, 1940

Eyes Of The Army
By Gordon Sear Williams 6

Douglas Observation YO-35 (3 view)
By Martin E. Dickinson 8

"Chuting" Your Model
By Clarence Maihori 10

Fundamentals Of Model Plane Design
By Charles Hampson Grant 12

Scout Of The Cruiser
By Robert McLarren 13

Your Model and the Law
By James R. Custin 13

A 40 Minute Record Breaker
By Charles Chilvers & Robert L. Brown 14

The Physics of the Airplane
By Lt. James Eames & Willis L. Nye 16

Frontiers
By Robert C. Morrison 17

Building The Double Duty Gas Model
By Sidney Struhl 18

Academy of Model Aeronautics 23

Gas Lines 24

Air Ways 25

Build and Fly The Fiat Pursuit
By William Winter 26

The Army's Flying Umbrella
By Douglas J. Ingells 31

National Model Aircraft Records 34

Coming Events 66

Flash News 70

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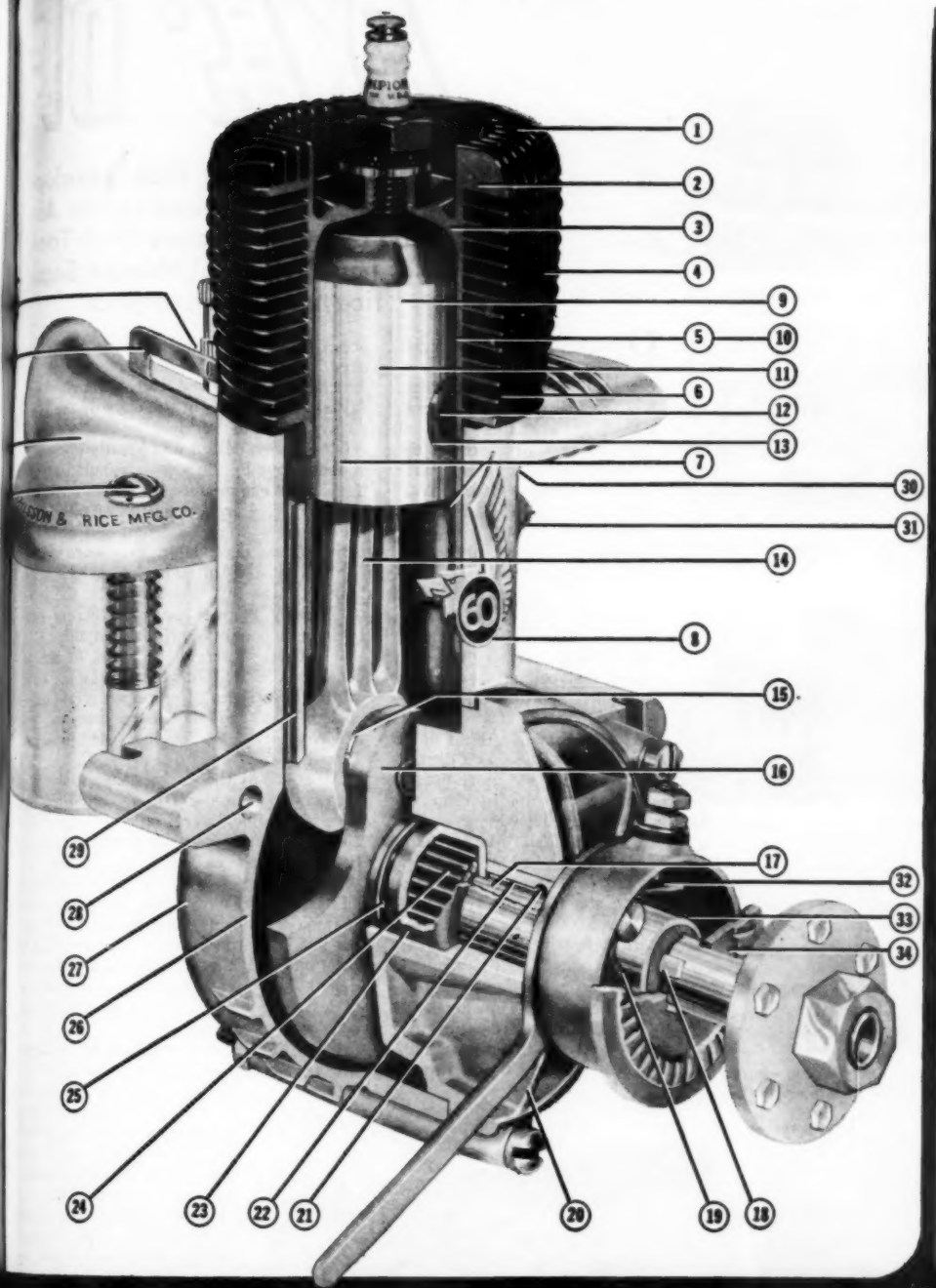
The ENGINE OF THE YEAR!



Cylinder

1. Thirty-two Cylinder Head Fins
2. Machined from Solid Alloy Steel
3. Hi-Compression Domed Combustion Chamber
4. Fourteen Cylinder Wall Fins
5. 1/10,000th Inch Cylinder Bore Tolerance
6. Black Hi-Temperature Baked Enamel Finish
7. Correctly Ported for Power & Efficiency
8. Electrically Spot Welded to Crankcase-Manifold
   No Leaks—No Distortion—Uniform Heat Distribution

Piston

9. Hi-compression Domed Head Baffle
   Heat Treated to Tough Inside & Glass Hard Surface
10. Ground to 1/10,000th Inch Tolerance
    Individually Lapped for Microsealed Compression
11. One Piece Drawn Alloy Steel
    LIGHTER THAN ALUMINUM—Longer Life

Wrist Pin

12. 5/16" Diameter Tubular Alloy Steel
    Heat Treated and Hardened Ground Polished Surface
13. "Snap Lock" Wrist Pin Keepers
    Eliminate Drag and Cylinder Wear

Connecting Rod

14. "H" Section Aluminum Alloy
    Designed to Withstand 20,000 R.P.M.
15. 3/8" Diameter Light Weight Bearing-Alloy Bushing

Crankshaft

Machined from Solid Alloy Steel

16. Crank Pin & Counter Weight Integral
    Heat Treated & Hardened
17. Ground & Polished
18. Positive Splined Drive
19. Timer Cam Integral with Crankshaft

Crankcase—Front Assembly

20. Recessed and Webbed for Strength, Heat Dissipation and Bearing Load Distribution
21. Cored Oil "Trap" for Main Bearing Lubrication
22. High Speed Bearing with Grooved Oil Retainer

Roller Bearings

23. Roller Bearing Race Hardened and Ground—Press Fitted to Crankcase
24. Twenty-One Hardened Steel Rollers to Withstand Radial Load and Eliminate Friction

Ball Bearings

Frictionless Thrust for Aircraft Engines Only

25. Eight Hardened Steel Balls—Steel Races
    Plain Bearing in Race Cars and Boats

Crankcase-Manifold

26. Proportioned Wall Thicknesses to Withstand Abnormal Shocks and Strains of Crashes, etc.
27. One Piece Aluminum Alloy Die Cast Unit
28. Combination Beam and Radial Mounting
29. By-Pass Manifold Integral with Crankcase
30. Exhaust Pipe Integrally Die Cast with Crankcase
31. Intake Tube Integrally Die Cast with Crankcase

Timer Assembly

32. Finest Tungsten Points—Positive Contact
33. Moving Breaker Point Actuated by Steel Spring
34. Fully Enclosed with Ignition Switch Feature

Carburetor—Fuel Tank Assembly

35. "Jiffy-Fill" Gas Cap
36. Die Cast Aluminum Alloy VENTURI and Tank Top
    Inverted Tank Top Available for Inverted Motors
    Full Throated VENTURI Insures Ample Air Passage
37. Positive Lock for Needle Valve Setting
38. Bread Mixture Control

Ignition Equipment

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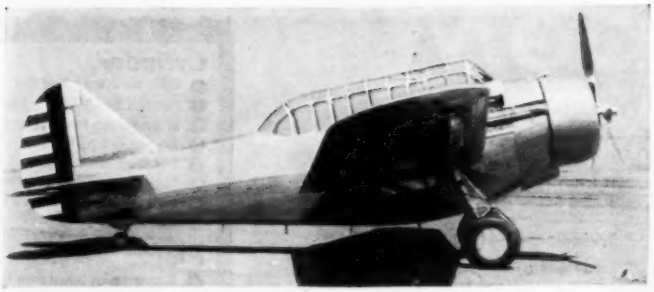
EYES OF

High Lights of Step by Step Development of U. S. Army Observation Aircraft and Details of Planes That Took Part In This Drama of Human Sacrifice and Perseverance



A modern high speed observation plane; the N.A.-047-A

Pioneer D.H.4M special, 400 hp. Liberty-powered air-mail plane

The Curtiss O-1A with 400 hp. Liberty engine. (Off. Photo U.S. Army)

The unique Curtiss O-26 powered with a geared Conqueror motor. (Off. Photo U.S. Army)

OBSERVATION aircraft performs the vital aerial warfare objective of spotting and reporting enemy operations. It was this form of warfare that first proved the value of aircraft in the early days of the first World War, and today, many years after, observation is still of prime importance to any army.

The requirements of a good observation plane are many. Not only must it have excellent visibility in all directions, but it must also have sufficient speed and ceiling to carry on extended spotting and photographic flights far from its base. Armament is light in the observation plane, as it depends on the swift and more maneuverable pursuits to clear the air of any opposition.

The United States Army Air Corps had its practical start in observation aviation with the time-honored DH-4. Over 5,000 of these two seaters were built in the last years of the war, and the armistice found us with immense stores of these ships on hand. In 1925 there were still over 1,000 DH-4's in active use, and it was not until the first of the present decade that the last was finally retired. These trusty old ships, it will be remembered, pioneered many of our present day air mail routes in the days of the U.S. Army Air Mail Service.

Observation design was greatly hampered in these days by the army's stipulation that the Liberty engine must be used in all planes of this type. Large quantities of these wartime engines were on hand, and although more or less dependable, they were not up to the standards of some later types being built. It was this insistence that the store of Liberty engines be used before new types were bought, more than anything else, that caused observation plane design to come to a virtual standstill for some time. With the entrance of more powerful liquid-cooled jobs and the more compact and efficient air-cooled engines, design again forged ahead.

Attempts in the early 1920's to build a better ship than the DH-4, still using the Liberty engine, were on the whole disappointing and none were produced in quantity. The first in this early "Corps Observation" series was the giant Gallaudet CO-1 all-metal monoplane. Although many years ahead of its time in design it was not put into production. It is interesting to note, however, that all present day observation ships are monoplanes, so that in theory at least the modern observation plane existed many years ago.

Other "CO" types were built by the Engineering Division of the Air Service, Fokker, Boeing and Loening-Atlantic. In the meantime numerous experiments were being tried out on the DH-4, and it now boasted a steel tube fuselage, making it somewhat less of a "Flaming Coffin" than it had been in early days. Various engines, both radial and in-line, were also tried with varying degrees of success, but none proved to be as good as the old Liberty 12.

Thomas Morse XO-6 with 400 hp. Liberty 12. (Off. Photo U.S. Army)

The fast modern Douglas O-46A with 750 hp. Pratt and Whitney Twin Row Jr. engine

Douglas O-38D powered with a 575 hp. Wright Cyclone motor

Douglas YOA-5 Super-Duck with two 750 hp. Cyclones

THE ARMY

By GORDON SEAR WILLIAMS

In 1924 the Air Service decided to have an open design competition for observation aircraft, and in response five manufacturers submitted their ideas for the ideal observation machine. It is with these ships that we start the history of our modern observation series. It is a story of great interest to all those aeronautically minded, as it traces the advance in airplane and engine design from 1914 to the present day as reflected in one of military aviation's most important categories.

The first of these new "O" planes was the Curtiss "Falcon" XO-1, a worthy forebearer of a famed line of aircraft that even today is considered "tops." A trim two-place biplane, using either a Liberty 12 or a Packard engine, the XO-1 proved from the first to be a great improvement over the DH-4. Swept-back upper wing panels, a sharp nose and an underslung radiator were features of this job and were also features of practically all Curtiss observation ships up to the O-26. In all, over 150 of the various O-1 types were built.

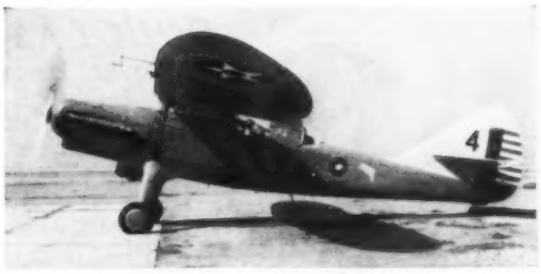
A second observation ship under the new series was made by Douglas and known as the XO-2. Seventy-five of the various O-2's were built, with the O-2H probably the most famous of any being used in many national guard and air corps units for some years. It is interesting to note that Douglas has made most all observation ships for the national guard from this O-2 to date, with the exception of the new North American O-47A.

Three other types were built at this same time, but none proved successful. The O-3 was a Dayton-Wright biplane, while the O-4 was a Cox-Klemin entry. The O-5 was another Douglas, being merely a modified version of the famed World Cruiser model.

Thomas Morse entered observation design with its XO-6, the first all-metal job in this category. It had a corrugated fuselage and tail, with fabric and metal wings. The Liberty 12 was used in this ship, although a later job, the O-6B, used a Wasp and greatly resembled the later O-19.

The Douglas O-7 was merely an O-2 with a 600 horsepower Packard supplanting the usual Liberty. Although speeds were somewhat higher for this job, upkeep and fuel consumption were so much higher that its use as a service type was not considered practical. Further engine changes in this type resulted in the O-8, using a 500 horsepower Wright "P-1" radial. This engine was actually the forerunner of the now famed "Cyclone," and was built in 1926. A geared Packard engine, swinging a huge windmill-like four-bladed propeller made the O-9 an unusual ship, which however, was destined to an experimental status only and was not produced for service. The next two Douglas products were of quite a different type from these first ships, but with the emergence of the O-25 some few years later, the O-2 design again came forth.

Certainly one of the strangest and most unusual army ships to be built was the Keystone-Loening XO-10, the army's first practical experiment along the line of the amphibian-observation plane. The XO-10 had but one wheel,

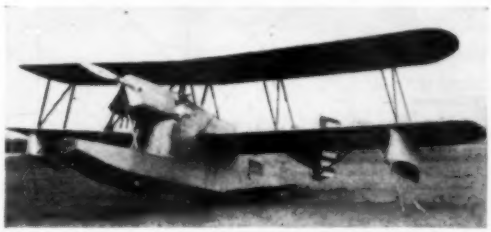


A fast semi-modern "parasol" Douglas O-43A powered with a 675 hp. Curtiss Conqueror engine

The little-known Gallandet CO-1, with a 400 hp. Liberty engine. (Off. U.S. Army Photo)

Liberty-powered Douglas O-2B. (O.U.S.A.P.)

Douglas O-8, 500 hp. Wright "P" engine

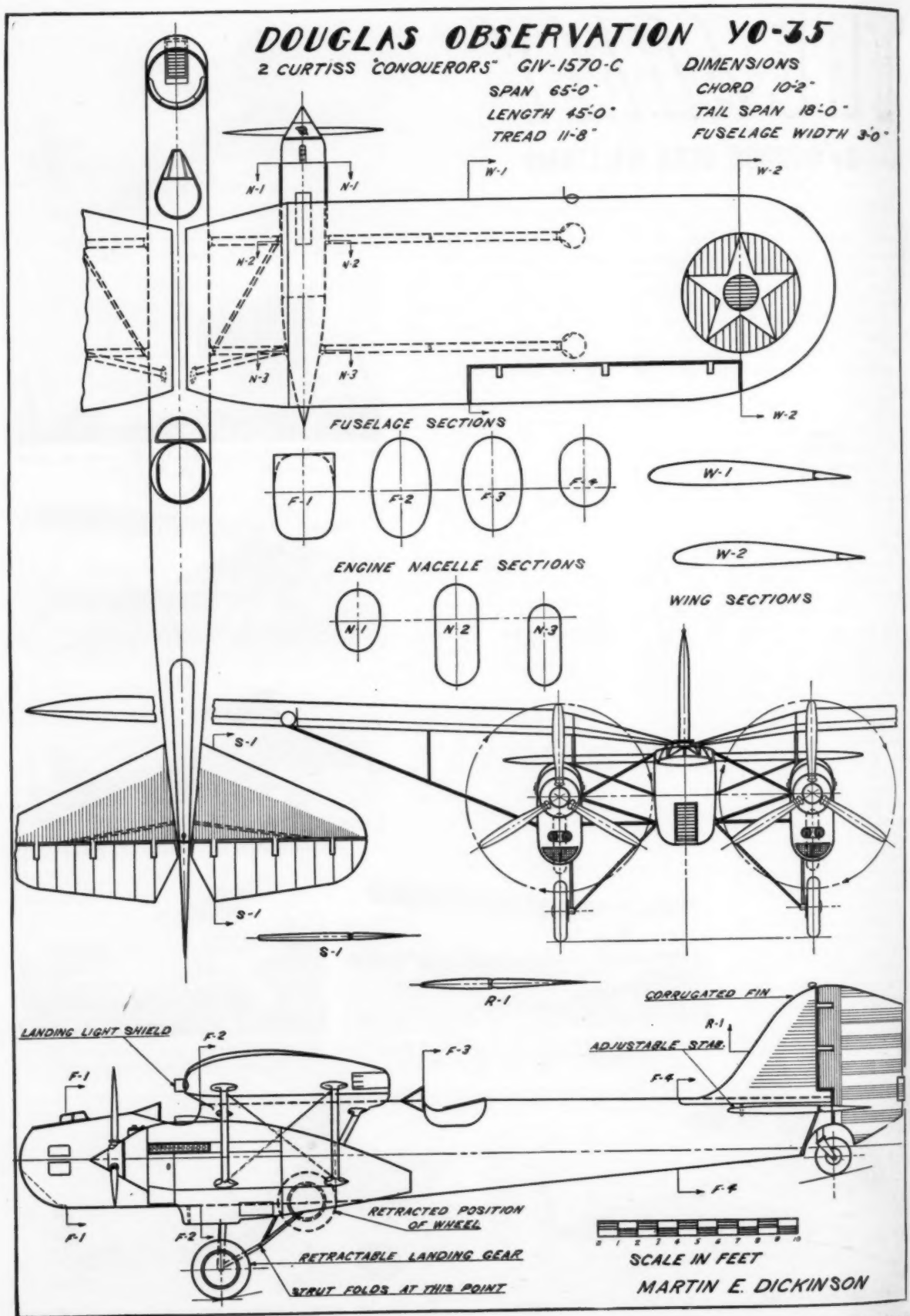


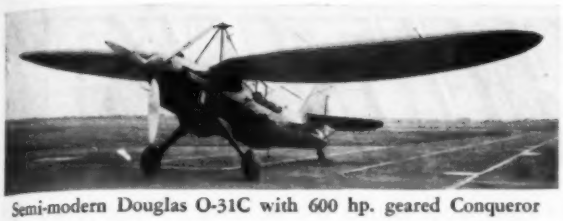
Unique Keystone Loening XO-10, with Typhoon 600 hp. motor. (Off. U.S. Army Photo)

The Douglas XO-14 with Wright J-5 220 hp. engine. (Off. U.S. Army Photo)

The familiar Douglas O-22 with a Wasp 450 hp. engine

The 600 hp. geared Conqueror-powered Douglas O-25C


DOUGLAS OBSERVATION YO-35
2 CURTISS "CONQUERORS" GIV-1570-C
SPAN 65'-0"
LENGTH 45'-0"
TREAD 11'-8"
DIMENSIONS
CHORD 10'-2"
TAIL SPAN 18'-0"
FUSELAGE WIDTH 3'-0"
N-1
N-2
N-3
W-1
W-2
FUSELAGE SECTIONS
F-1
F-2
F-3
F-4
ENGINE NACELLE SECTIONS
WING SECTIONS
S-1
R-1
LANDING LIGHT SHIELD
CORRUGATED FIN
ADJUSTABLE STAB.
RETRACTED POSITION OF WHEEL
RETRACTABLE LANDING GEAR
STRUT FOLDS AT THIS POINT
SCALE IN FEET
MARTIN E. DICKINSON



Semi-modern Douglas O-31C with 600 hp. geared Conqueror

Unique Douglas O-35, two 600 hp. geared Conquerors

which protruded from the bottom of the boat-like pontoon. Lateral stability was gained by virtue of skids on each wing tip float. An air-cooled Wright "Typhoon" V-12 engine powered this odd experimental job.

The O-11 "Falcon" was much like the O-1 in general design, but had many new improvements in construction and armament. Repairs were more easily made due to conveniently placed inspection panels and the "beefed-up" fuselage more easily withstood landing shocks. 66 of the O-11's were produced and one O-11A was made, the latter being an official ship that carried no armament. In hopes of getting better performance from this type ship the O-12 mounted the lighter and more compact "Wasp" engine. As a still further experiment with new engines a Conqueror V-1550 engine of 500 horsepower was installed in the next in line, the XO-13. One XO-13A was made using skin-type radiators, but proved unfit for service use as have all skin-type cooled ships to date. An O-13B was made as an official ship for the Secretary of War. The O-13C was similar to the popular O-1E except in powerplant, the former using the Conqueror while the latter had a Curtiss D-12 of 435 horsepower. As a further experiment the XO-16 was built, having a new cooling system to allow rapid climbs at high speed, one of an engine's hardest tasks.

In 1928 the need became apparent for a specialized training-observation plane for the national guard units, and in answer to this problem contracts were let to three companies for the following "light" observation-trainers: Douglas XO-14, Keystone XO-15 and Consolidated XO-17. In general these three ships were very much alike and all used the Wright "Whirlwind" J-5 engine of 220 horsepower. The Consolidated XO-17, a modification of the popular PT-3, was victorious and an order for 29 was awarded.

The next ship in the "Falcon" line was the XO-18. A newly developed Curtiss "Chieftain" engine, having twelve cylinders in two banks, was used for the first time in this ship, but proved to have serious cooling difficulties and was not used in service. This engine was unlike present day twin-row types in having the rear bank directly behind the front row.

The Thomas Morse O-19's are well known in all parts of the United States. Although confined at present to reserve and national guard squadrons and rapidly being replaced with newer ships, they were for some time a first line observation ship. Over 100 of the O-19, O-19B and O-19C types were made, all using the 450 horsepower Wasp engine. The one and only O-19D was an official ship, used as a utility and transport job wholly. A few O-19E's were made as well, having 500 horsepower supercharged Wasp engines. As these O-19's were all rather slow, an attempt was made to boost speeds by mounting a 575 horsepower Hornet engine. This ship became the XO-20. Still further experimental models appeared; first the XO-21 with a twin-row Curtiss "Chieftain," then the O-23 with a 600 horsepower Conqueror.

General Aviation (Fokker) O-27 with two 600 hp. geared Conqueror engines

Douglas strayed somewhat from their usual type in the O-22, a biplane with sharply swept-back upper wings and an all-metal tail. It proved to lack performance in advance of other types and was not produced in quantity.

In many cases throughout the observation series, as in others, certain numbers have been left vacant where airplanes under construction have been abandoned because of the rapid improvements in design while the ship was being completed. Although some of these ships may have been completed and flown at least once, most of them were not brought from the shops and either were scrapped or emerged under a new name after being changed in view of late improvements. Such ships as these were the O-24, O-30, O-34, O-37, O-42, O-44 and O-45.

Douglas O-25's were favorites of many army pilots. These famous biplanes greatly resemble the early O-2's in many respects and are nothing more than an improvement of this type. The O-25A had a top speed of 161 miles an hour and cruised at 141. The O-25B used a larger radiator than the "A" and differed mainly in this respect, while the "C" had a sharp spinner nose with separate radiators for oil and prestone. It topped just over 165 miles an hour.

Curtiss "Falcon" O-39 with 600 hp. Conqueror

Curtiss "Raven" Y10-40B, with 680 hp. Cyclone

Thomas Morse XO-932 (Y10-41), 600 geared Conqueror

The Curtiss O-26 was the first of the "Falcon" line to use the geared Conqueror engine. The radiator was moved forward and was a flat-plate surface just behind the prop hub, rather than being underslung as had been the case. This placing of the radiator has since been found far less efficient than the underslung type as it not only breaks the general streamlining of the fuselage but due to the "blanketing" effect of the hub its cooling rate is much slower.

Fokker's first observation ship and, incidentally, the first service observation monoplane, was the O-27. A new venture in army observation design, it was twin-engined and carried a crew of three. Designed especially as a long-range ship, its two geared Conqueror engines gave it a top speed of 180 miles an hour. The three place observation proved to have many advantages over the smaller type, and our standard ship today, although only single motored, carries a three man crew; it proved to be rather difficult for one observer to efficiently carry out his three-fold duties as radioman, gunner and observer.

The only Vought "Corsair" to be purchased in recent years for air corps use was the O-28, a

(Continued on page 56)

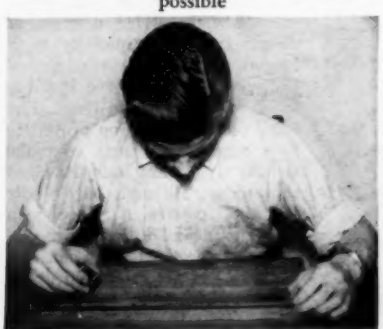
"CHUTING"

How to Design and Build Parachutes That May Be Applied to Your Model Planes and Used In Other Thrilling Ways

Iron the tissue carefully before cutting out the gauze from it. This makes your work easier

The tissue paper is carefully folded so that all the gores may be cut out at once, using a template

When cementing the sections together be sure that they are glued in as straight as possible



The thread for the shroud lines is wrapped around two pins, set the correct distance apart, and then cut

"THERE he goes!" How many times have you heard the crowd at your local airport or fair grounds, as they saw the parachute jumper leave the plane, cry those words? Or felt the gasp that goes through the people as he hurtles through the air until his chute blossoms out like a gigantic umbrella? Very few? Well, although you cannot enjoy such a real thrill every day, you may be thrilled in your own small way through the medium of a scale model. Just as your gas or rubber powered models thrill you with their realistic flights through the air, so will this little parachute thrill you and further your knowledge in aeronautics.

You will find this parachute an excellent addition to your model collection, for it is exceedingly simple to construct and lots of fun can be had with it either indoors or out. Many experiments may be carried on with model parachutes wherein much pleasure and practical knowledge results. Attaching a chute to your model plane will be an interesting one. Packing parachutes, designing them, finding the stress points of a parachute and other instructive procedures may be easily carried on with little loss of money and without endangering anyone's life or property.

Before starting to construct this model it might be well to point out that the larger the parachute that you plan to build the more it will cost in proportion. So it is well to keep the first parachute a small size, to gain experience and a general working knowledge.

If one plans to build the model parachute smaller than two feet in diameter, it is best to use Jap tissue because of its economy and durability. However, if you can sew fairly well (or your mother or sister can and will) and wish to spend a little more, it would be advisable to use silk in view of the fact that a more realistic chute would result. But for average use a good grade of tissue will do as well and the lasting qualities, in spite of the rough handling and folding, are wonderful. And, should the chute get hung up in a tree or light in some inaccessible place, the loss will be very small.

For the size parachute shown in the plans all that is needed in the way of materials are the following: two sheets of 20 x 24-inch Jap tissue, a spool of size 50 mercerized silk thread, a sheet of stiff bond paper and a small amount of glue and paper cement. The total cost of these articles should not exceed 25 or 50 cents.

After these materials are obtained you are ready to start on the chute. The first step is to iron the Jap tissue out carefully. Use a fairly hot iron and keep it moving so as not to scorch or burn the paper. This step is quite important for it will save you much time in cutting the gores out; the smooth unwrinkled paper is so much easier to handle and to cut. An ordinary ironing board makes a good base upon which to iron the tissue.

The next step is to cut out the gores for the parachute. To cut these accurately a template should be made from bond paper, copying the model shown on the plans. Then, by carefully folding the Jap tissue to

Threads the correct length are glued to the chute at the intersections

After cutting the rises from stiff bond paper they are glued together carefully

YOUR MODEL

By CLARENCE MAIHORI

approximate size, the template may be pinned or clipped onto the tissue and the gores easily cut with razor or scissors to the correct shape and size. An alternate method would be to cut each one out singly. Some paper is saved by using this method, but unless much care is used the results are usually not satisfactory except in the case of a larger model.

The gores should be glued together by using the paper cement and by overlapping the seams not more than one-eighth-inch, carefully keeping the seams straight and the vent hole in the center as round as possible. The finished chute should lie almost flat and should be perfectly round.

Should a little more realism be desired, fake seams may be easily drawn in, as shown in the plans. These are drawn with a very fine ruling pen set and India ink. The various points are first marked off with a pencil and the fake seams made with a rapid movement of the ruling pen to prevent blotting.

The chute lands your model gently and with little or no damage

6 of the 24 shroud lines are tied together at one end, then glued to the rises

It might also be well to mention here that there is no end to the variety and number of color combination possible. It is a simple matter to make the chute all one color; half one color and half another; three colors, such as red, white, and blue; checkered, and well, any combination you might want. The parachute shown in the photographs is red and white.

The model plane descending via parachute

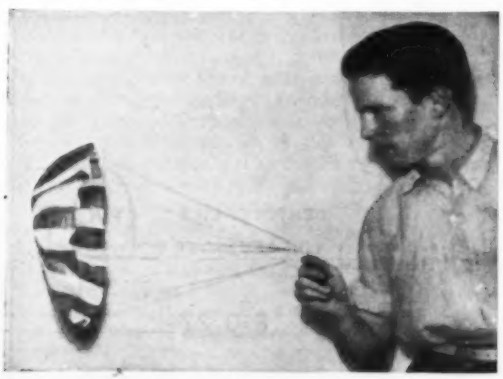
When the canopy has been assembled, the shroud lines and risers should be considered. The shroud lines should all be cut at once to insure uniformity of length. The best way to do this is to wrap the size 50 thread around two pins, pinned a little over 15 inches apart, then cut the thread where it wraps around the pins and you will have them all the same length. There are twenty-four of these shroud lines, each one 15-inches long.

Here the parachute is being tested with the dummy

One shroud line is glued to each seam at the canopy skirt. About one-quarter inch length of thread is used for gluing. An exceedingly strong chute may be made by extending the lines all the way over the canopy, and if so desired the chute may be readily constructed in this manner with very little trouble. Of course in that case the threads would have to be cut longer.

The risers are cut from bond paper or they may be cut directly from the plans in this magazine. They are cut as shown and folded in the center and glued together along the center to form sort of a Y construction; the ends being left free for the attachment of the shroud lines.

After this has been finished the shroud lines are glued on to the risers. The lines from the chute are tied together in groups of six, using a square knot at the end. Each set is then glued to one of the risers. The parachute is now complete except for the pin hooks. By bending a couple of these from common pins the chute may be easily attached to almost anything.



Here is the finished parachute, ready to attach to your model or use in other ways

The parachute model may be flown or operated in many different ways. Possibly the easiest method is using some sort of weight attached to the chute and dropping it off a high building. Other methods would include dropping

(Continued on page 48)

Chapter 2—Article 11

By

CHARLES HAMPSON GRANT

FUNDAMENTALS OF MODEL PLANE DESIGN

How to Design Your First Power Driven Model Plane—Designing For Stability

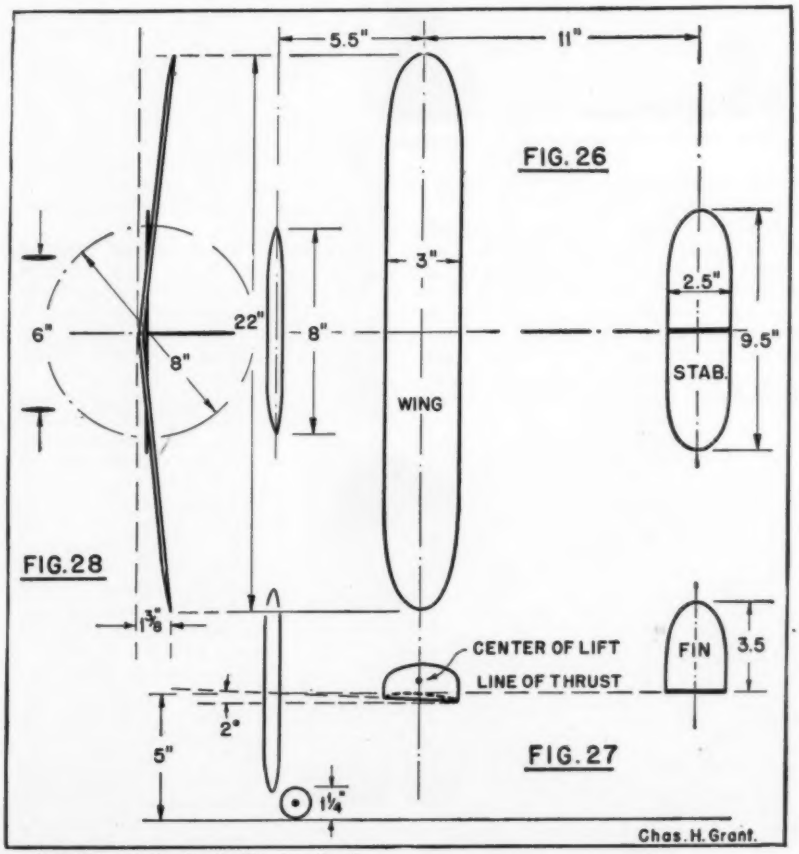
THE steps to take in order to successfully complete your first model plane have been listed in preceding installments of this series of articles. However, the reader should have the plan of procedure well in mind, therefore, it will bear repeating at this time. The steps are as follows:

1. *Decide upon:* The purpose your model is to fulfill.
2. The type that will serve the purpose most efficiently.
3. The size of the craft.
4. The aerodynamic proportions of the plane and its parts, using the rules of design to endow it with the characteristics of flight that you wish it to have.
5. Lay out the outline design of the ship on paper and then make detailed drawings of it.
6. Make a bill of materials required for the plane.
7. Build the plane according to the plans.
8. Adjust the completed craft for flight, setting the wings and tail surfaces correctly in respect to position and angle.
9. Test-fly the plane and make minor adjustments until perfect flight characteristics are attained.

So far the first three steps, and part of the fourth, have been worked out. The fourth step consists of determining the aerodynamic features of the plane as follows:

1. Wing Span. 2. Wing Chord. 3. Wing Curve or Section. 4. Wing Dihedral. 5. Wing Area. 6. Shape of Wing Tips. 7. Position of the Wing Relative to the Line of Thrust. 8. Propeller Diameter. 9. Propeller Pitch. 10. Propeller Blade Area. 11. Tail Moment Arm. 12. Nose Length. 13. Stabilizer Area. 14. Stabilizer Span. 15. Stabilizer Chord. 16. Stabilizer Angle Relative to the Wing. 17. Fin Area. 18. Fin Height. 19. Fin Depth. 20. Length of the Landing Gear.

The features from one to ten inclusive, except seven, have been determined. These include the features of the first two factors of flight, i. e., a *means of lift* and a *means of propulsion*. The third factor, stability, and the factors eleven to nineteen which it includes, now must be considered.



Tail Moment Arm

Factor 11, the tail moment arm, is important in respect to the longitudinal or "up and down" stability and to the directional or "right and left" stability of the plane.

This craft is to be of a simple standard type, so simple basic rules of proportion will suffice. The general rule for the tail moment arm is: *Make it about equal to half the wing span* and *never less than three times the chord.* This is the distance from the center of the wing to the center of the stabilizer. The longer it is the more stable the plane will be, so we will establish its value at half the span. The span is 22 inches so the moment arm should be 11 inches. Thus the position of the tail planes, the stabilizer and fin, relative to the wing, have been established.

Nose Length

The nose length is the horizontal distance from the center of the wing to the rear face of the propeller hub. This is factor 12. It is important to give this distance the correct value in order to have your model balance at a point under the center of the wing. This point of balance is the center of weight or gravity of the airplane and it should be located approximately under the center of lift, which is near the center of the wing; usually a little forward of it. Experience indicates that the nose length should be equal to about *one-half* the length of the tail moment arm. This will be half of 11 inches, or 5.5 inches.

Stabilizer Area

The area of the stabilizer is a very important factor in longitudinal stability. Too little area causes erratic flights. Too much area only reduces the efficiency of a plane slightly. Consequently it is always better to have too much area than too little. Every type of tractor plane with a landing gear will have sufficient stability if the stabilizer area is equal to 1/3 of the wing area. The area of the wing is 60 square inches. Therefore, the stabilizer should have 20 square inches of area.

Stabilizer Span

The following is a good rule to follow in respect to the stabilizer span; one

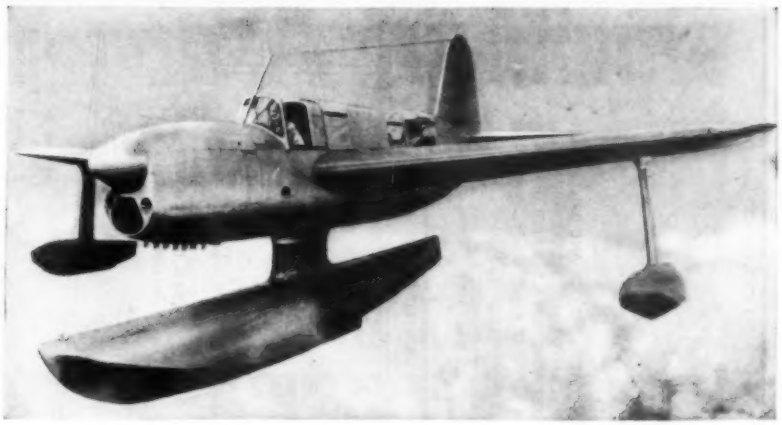
(Continued on page 68)

Copyright 1940 by Charles Hampson Grant

Scout Of The Cruiser

THE CURTISS XSO3C-1

By ROBERT McLARREN



THE PLANE ON THE COVER

IF YOU can imagine a large manufacturing company operating with a personnel consisting of a President, a Vice-President and a Board of Directors, all of whom direct the company's activities and then one other man down in the shop who does everything else, then you can get a close approximation of the work of the Naval Scout-Observation airplane. For the VSO ships are the planes which "do everything else" in the Aircraft Scouting Force.

They are the jack-of-all-trade of naval aviation. The Bombers do the bombing and the Fighters do the fighting but the VSO's do everything else.

For instance, just to list a few of their duties we'd find they are called upon to direct the fire of the battleships' big guns, to scout out enemy submarines, enemy vessels and mines, to report the location and formation of the enemy fleet, to lay smoke screens around our naval vessels, to bomb and machine-gun isolated ships of the enemy, to fight enemy aircraft in the defense of our ships and, during peace time, to do liaison work between ships and shore stations and between naval air stations, to serve on inspection tours and various other uses by commanding officers as personal ships, plus a hundred other myriad duties such as flood relief work, coast guard work, mapping and rescue work.

Every one of these duties demands some particular bit of design work by the engineering staff of the manufacturers. Directing gunfire demands the installation of a suitable fire control device in the floor of the rear cockpit; scouting for enemy fleets, submarines, mines, etc., demands lots of vision in all directions and the installation of complete transmitting and receiving radio equipment; bombing and fighting require the installation of bomb racks and machine guns; liaison work makes it imperative that radio compass, marker beacon receiver and direction finding equipment be installed. Various items of standard navy equipment must be carried such as flotation compartments in the wings, quickly inflatable life rafts, emergency rations including fresh water, first aid kits, pistol flare and parachute flares and a dozen other items. And in addition the ship must be readily convertible from a landplane to a seaplane and vice versa and to be design-stressed for catapult launching.

So, obviously, designing a VSO plane is no small job. And yet two manufacturers have met these exacting specifications so thoroughly and successfully that both have been awarded sizable contracts: the Vought-Sikorsky XSO2U-1 and our Plane on the Cover this month, the Curtiss XSO3C-1.

The XSO3C-1 is actually a development of original Vought-Sikorsky designs. The Vought XSB2U-1 two-seater dive-bomber with the characteristic swiveling retractable landing gear was redesigned into the XOS2U-1 for use as a catapult single float seaplane, although the original model was a landplane. This ship, fitted with a

(Continued on page 38)

Your Model and the Law

PART No. 1

By JAMES R. CUSTIN

"FIVE bucks! But gosh lady, five bucks is an awful lot of money, and after all, the plane didn't do any damage when it landed on your lawn."

"You heard me, young man. I want five dollars or that plane stays right where it is in my house. If you boys think that you're going to make a landing field for toy airplanes out of my front yard, you might as well pay for the privilege."

Well chum, there it is and there she is and there you are.

Can she do it to you? Let's see what the law says about all this. While we're at it, let's see what the law is on some of the other situations that model airplanes and their builders can get themselves into.

In the first place, we'll have to have a little elementary law theory—but don't let it get you down. It's really easier than aerodynamic theory because lawyers have never tried to use math in solving their problems.

There are two kinds of law in this country and in England. One is the so-called common law, which is made up of the decisions of the courts on actual cases that have been brought before them. The other is statutory law. Statutory law is the kind that is passed by the various legislative bodies and is written out in the statute books.

When a lawyer wants to find out what the law is on a particular subject, he first goes to the statute book to see what laws have been passed on that subject. Then he looks up the decisions of the courts on that particular question to see how they have interpreted the statutes, or, if there are no statutes, what the rules of the common law are. And the most important thing to remember about the common law is that it is based on common sense.

So let's take a peek into the statute books first of all and see what the various legislatures have had to say about this all important matter of model airplanes.

The United States government, Civil Air Authority, in its laws on aircraft known as the Civil Air Regulations has given some notice to the question of models. In the chapter on Air Meet Rules we find section 60.96 of the Civil Air Regulations, which we might very profitably read in full:

"60.96 *Aircraft Model Flying Activities, Supervision of.* No model aircraft shall be flown from, or over, any airport or landing field unless permission therefor, in writing, has been secured from the airport manager or his duly authorized representative. The airport manager shall designate the portion of the field to be used and shall take all necessary precautions to assure the safety of the public on the ground and of aircraft in the air. Rules governing the conduct of such activity shall be drawn, and shall include:

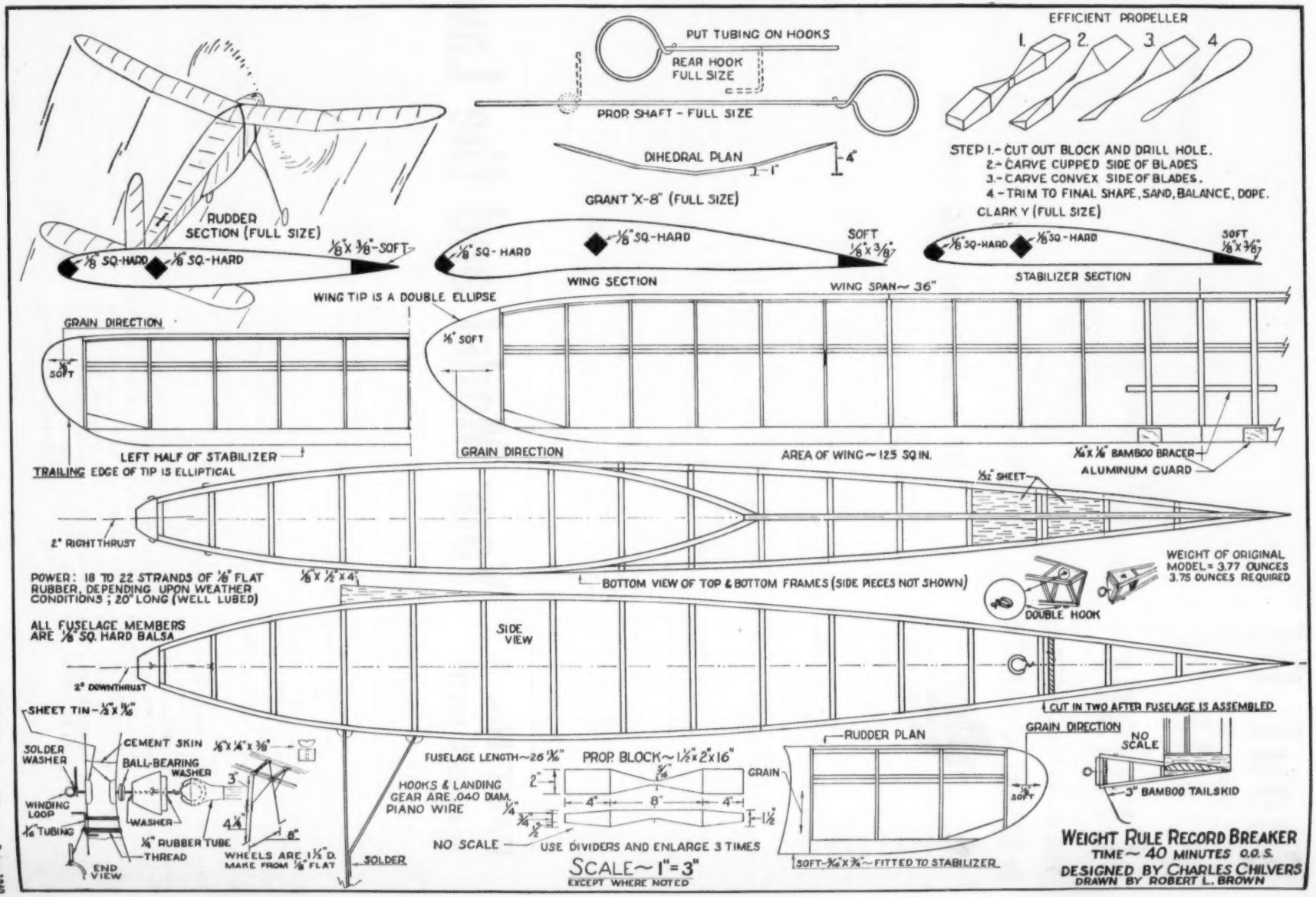
60.960 (a) The definite boundaries of the area to be utilized.

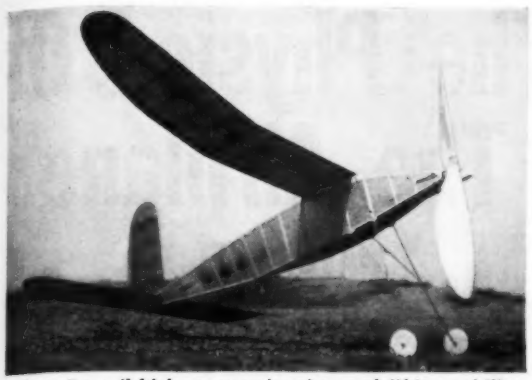
60.961 (b) The periods of suspension of activity before, during and after any scheduled or other aircraft operations.

60.962 (c) The limitation of duration of flight of the models.

60.963 (d) Procedure for the retrieving of models.

(Continued on page 70)


PUT TUBING ON HOOKS
REAR HOOK FULL SIZE
PROP SHAFT - FULL SIZE
DIHEDRAL PLAN
1"
4"
EFFICIENT PROPELLER
1.
2.
3.
4
STEP 1.- CUT OUT BLOCK AND DRILL HOLE.
2.- CARVE CUPPED SIDE OF BLADES
3.- CARVE CONVEX SIDE OF BLADES.
4.- TRIM TO FINAL SHAPE, SAND, BALANCE, DOPE.
GRANT "X-8" (FULL SIZE)
CLARK Y (FULL SIZE)
RUDDER SECTION (FULL SIZE)
1/8" SQ-HARD
1/8" SQ-HARD
1/8" X 3/8"-SOFT
1/8" SQ- HARD
1/8" SQ-HARD
SOFT 1/8" X 3/8"
WING SECTION
1/8" SQ-HARD
1/8" SQ - HARD
SOFT 1/8" X 3/8"
STABILIZER SECTION
WING TIP IS A DOUBLE ELLIPSE
WING SPAN ~ 36"
GRAIN DIRECTION
1/8" SOFT
1/8" SOFT
LEFT HALF OF STABILIZER
GRAIN DIRECTION
AREA OF WING ~ 125 SQ IN.
1/16" X 1/16" BAMBOO BRACER
ALUMINUM GUARD
TRAILING EDGE OF TIP IS ELLIPTICAL
1/32" SHEET
2° RIGHT THRUST
1/8" X 1/2" X 4"
BOTTOM VIEW OF TOP & BOTTOM FRAMES (SIDE PIECES NOT SHOWN)
WEIGHT OF ORIGINAL MODEL = 3.77 OUNCES
3.75 OUNCES REQUIRED
POWER: 18 TO 22 STRANDS OF 1/8" FLAT RUBBER, DEPENDING UPON WEATHER CONDITIONS; 20" LONG (WELL LUBED)
DOUBLE HOOK
ALL FUSELAGE MEMBERS ARE 1/8" SQ. HARD BALSA
SIDE VIEW
2° DOWNTHRUST
CUT IN TWO AFTER FUSELAGE IS ASSEMBLED
SHEET TIN - 1/2" X 1/16"
SOLDER WASHER
CEMENT SKIN
1/16" X 1/4" X 3/8"
BALL-BEARING WASHER
WINDING LOOP
1/16" TUBING
WASHER
3"
4 1/4"
8"
1/4" RUBBER TUBE
THREAD
WHEELS ARE 1 1/2" D. MAKE FROM 1/8" FLAT
END VIEW
SOLDER
FUSELAGE LENGTH ~ 26 1/16"
PROP. BLOCK ~ 1 1/2" X 2" X 16"
HOOKS & LANDING GEAR ARE .040 DIAM. PIANO WIRE
2"
5/16"
GRAIN
4"
8"
4"
1/4"
3/4"
1/2"
1 1/2"
NO SCALE
USE DIVIDERS AND ENLARGE 3 TIMES
SCALE ~ 1" = 3"
EXCEPT WHERE NOTED
RUDDER PLAN
SOFT - 1/16" X 3/4" ~ FITTED TO STABILIZER
GRAIN DIRECTION
NO SCALE
3" BAMBOO TAILSKID
WEIGHT RULE RECORD BREAKER
TIME ~ 40 MINUTES O.O.S.
DESIGNED BY CHARLES CHILVERS
DRAWN BY ROBERT L. BROWN



Its large "prop," high-aspect ratio wings and lifting stabilizer insure maximum performance

A 40 Minute Record Breaker

How to Build and Fly a High-Powered Soaring Weight-Rule Plane That Will Be a Threat In Any Contest

By CHARLES CHILVERS and ROBERT L. BROWN

THIS model was first designed and built during the early part of 1937. A fine performer in either calm or windy weather it had an average flight of about two minutes; the original model (old N.A.A. weight rule) was lost from sight after six minutes and never recovered. From these same plans the model shown was built. Just like its predecessor, except for the wing airfoil section (changed to Grant X-8, it too was a beautiful flyer. It had a tremendous, almost vertical, climb followed by a very flat glide, sensitive to every thermal current. This record model was lost after a flight which lasted forty minutes, going out of sight after breaking the Long Beach, California, record for fuselage models on August 20, 1938.

Since the plans are very clear the building instructions will be kept as brief as possible. By enlarging the plans three times with dividers a full size drawing may be made.

Fuselage

The fuselage is built up of 1/8" square hard balsa. Construct the top and bottom directly from the plan; the sides are not built first as is usually done. Make the top first and while drying work on another part of the model. After the top is dry, set it aside and construct the bottom, fairing the two longerons into one as shown on the drawing. Starting at the nose of the fuselage, cement in all the uprights which form a rectangular cross-section. After joining the tail longerons together finish placing all the uprights in place. Since the fuselage is made as a complete unit the tail boom is next detached. Put the bulkhead in the boom and cement in the rear hook (.040 diameter piano wire).

The nose block is cut from a medium grade block of balsa 1/2"x1"x1". Drill a hole in the block and glue washers on either side, as shown on drawing.

Wing

Make the wing as one complete unit, forming the polyhedral angle after construction is completed. Cut all ribs of 1/16 inch medium grade sheet balsa, except five which are of 1/8 inch flat; trim and notch for leading and trailing edges and place on the spar. Pin leading and trailing edges in place and cement every rib well. Cut tips of 1/8 inch soft sheet and cement to end rib. After wing is dry trim leading edge, trailing edge, and tips to shape. Form the polyhedral angle as shown, noting extra center section brace.

Tail Unit

The elevator and rudder are made in the same manner as the wing, using wood sizes and grades as specified on the plan. After the elevator and rudder are covered and doped cement them directly to the tail boom; elevator is set at zero degrees incidence, and the rudder's trailing edge is set approximately 1/32 inch to the right (looking at the model from the tail).

Climbing steeply to grab a "thermal"

Propeller

One of the most important parts of a good flying model is the propeller. It must be perfectly balanced and running smoothly in order to obtain good flights consistently, so be sure to take your time and do a good job on this vital part. Cut blank, as shown on drawing, from block measuring 1-1/2"x 2"x16". Taper blades from 5/16 inch at hub to 1/16 inch at tips. Cut blades to 1/8 inch cup maximum at the one half-way point, diminishing to symmetrical cross-section tips.

Covering and Doping

Sand all parts well before covering, in order to remove "burs." Due to the new ruling that timers cannot follow models when timing, it is best to make the total bottom surfaces, as well as all lateral surfaces of the model, a color easy to see. Purple or dark blue is suggested for this purpose. Cover top surfaces with either yellow or white in order to see the model readily after landing. Use dope to apply paper and always run the grain of the paper the long way in order to eliminate excessive sagging.

Cover the total under-surface of the wing first, sticking the paper directly to the under-side of each rib in order to obtain the best airfoil, then covering each top section separately. Spray the entire model with water, and paint with clear dope to which has been added two or three drops of castor oil per ounce of dope. This not only gives a glossy finish which glistens in the sun but it also makes the paper more flexible.

Dope the propeller and nose plug until a high gloss is obtained. Sand with a finer grade of sandpaper between each coat until "ten nought" is reached. A natural wood filler is obtained if the dust left after sanding with fine sandpaper is left on while the next coat is being applied.

Miscellaneous

Attach free wheeler and hook to propeller as shown. Glue hooks on nose plug, fuselage and tail boom. The hooks used are the common "hook and eye" type obtained at any five and ten store.

Bend landing gear from .040 diameter piano wire and attach as shown.

Cement wing mounts directly to fuselage as indicated.

(Continued on page 52)

Floating gently back to earth

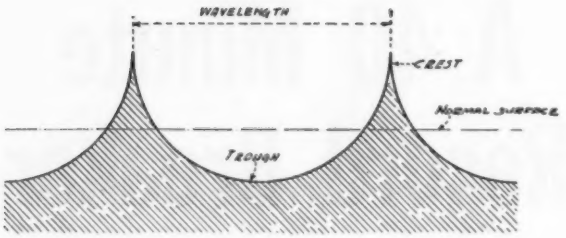


Fig. 1. The characteristics of wave form

The Physics Of The Airplane

WAVE MOTION

Article 15

By LT. JAMES EAMES and WILLIS L. NYE

THE transmission of energy from one point to another always occurs in the form of a "wave motion." Perhaps one of the most common demonstrations of this physical phenomenon is illustrated when a stone is dropped into a pool of still water. Then the surface of the pool is covered with wavelets, circular in form, which radiate out from the central point where the stone entered the water. These circular rings grow wider and wider as the distance from the central point increases. To us, standing at the edge of the pool, it apparently seems that the water is actually moving outward from the central point. As a matter of fact, this is not the case since the water merely rises and falls again. This condition would be adequately demonstrated if we were to drop a chip of wood into the agitated water. Rather than move forward, the chip would tend to return again and again to its original position, from which it becomes evident that the water beneath it possesses an upward and downward motion instead of the seemingly apparent forward motion. A common parallel demonstration occurs when a seaplane is moored in the water and waves, emanating from some other source, move the moored seaplane up and down in a manner similar to the wood chip we have just discussed.

Many of us have had the occasion to straighten out the "kinks" out of a rope. The common procedure in this case is to attach one end of the rope to a rigid wall and shake the free end vigorously. These sharp jerks travel along the length of the rope, each portion communicating the motion to the adjoining portion. From this it can be ascertained that, although the motion moves forward, the individual particles of the rope move only up and down.

Flexible cables used in airplane construction for controls need to be straightened out and stretched to their natural assumed shape and a special machine is employed for this specific function. The cable as it is received from the wire factory tends to show some curling up and kinking and these must be removed before the cable is suitable for aeronautical use.

When a seaplane hull is immersed in a body of water, the attendant upward and downward motion causes waves to spread out from the hull. These waves are developed since the tendency of the force of gravity is to always maintain a level surface on the water. When moved slowly through the surface of the water, as in a taxying operation, the hull sets up short waves, called ripples, on the side towards which the nose of the hull is moving. These waves emanate from the restoring force, made up of the reactions of the displaced parts, which arises out of the surface tension. In deep water, waves are formed by the particles describing circles in a vertical plane. While traveling on the crest, a particle of water moves in the same direction as that of the mass of water. While in the trough, a particle moves in a direction opposite to that of the mass of water. The effect of deep water waves is not felt for more than a short distance down from the surface of the water, since the radii of the circles in which the particles move decreases as the distance below the surface is increased.

We are very much concerned with a study of wave motion insofar as aircraft, model and full scale, are concerned which are used for water operations. The design of the hull must be such that the waves emanating from the hull must be of such a shape as to cause the minimum of retardation upon the hull. The characteristics of these wave formations are an influencing factor in hull design and the shape of the hull. We have a complex problem in seaplane design because the hull must conform to the

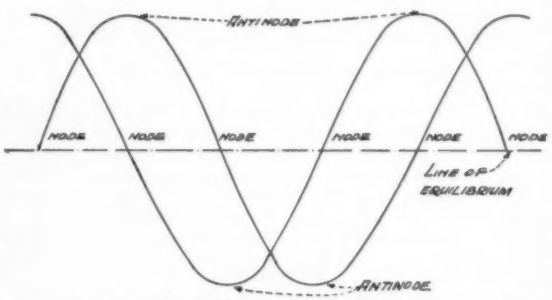


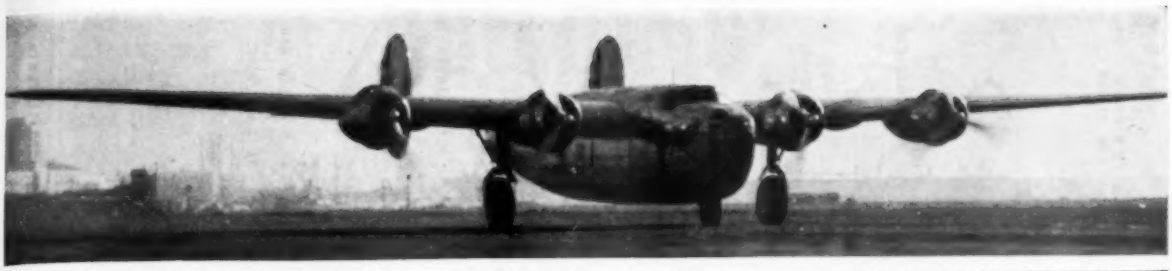
Fig. 2. The characteristics of a train of wave motion

general requirements of hydro and aero dynamics. The chief source of this experimentation is carried on by the N.A.C.A. at Langley Field, Virginia, where the Committee maintains extensive equipment and a big towing basin for tests on hull forms and wave forms. The models, built to scale, are towed in the basin by a mechanical chassis and special equipment analyzes the characteristics of the waves; in some instances even photographs are made of the wave forms. Thus a visual and a mechanical record is made of the water waves generated by the action of the fast moving hull. A hint to model makers interested in hull design is this: The N.A.C.A. has constructed a number of hull designs which conform to the best practice and by applying to them, the considerable data is available to the model maker who is interested in seaplanes. The same principles are involved in each case.

It is erroneous to form the impression at this point in our discussion that liquid and fluid mediums are the only ones which lend themselves to the development of wave motions or forms. Any substance which has an elastic characteristic can be made to transmit waves through its interior. Paradoxically, metals even though very massive as a substance, are subject to wave motion. The term "compressional waves" amply describes these waves, since they are produced by means of a center of disturbance which can either compress or expand the matter immediately surrounding it. And to this, metals are no exception. When such waves spread out from a center of disturbance a surface can be described that locates, at any instant, the points to which the disturbance has reached. The surface thus described is termed a "wave front." Dimpling and wrinkling of a stressed skin surface of a metal monocoque airplane structure, when severely overloaded occurs in the form of a wave, emanating from the central location at which the overload was originally applied. As long as the overload does not exceed the elastic limit of the metal, no harm is done but if it is, the metal will rupture. A prominent type of tactical airplane has recently undergone extensive redesign procedure which incorporates "beefing up" the gauge of its stressed skin metal wing covering. Employed in dive bombing operations, the excessive air loads imposed on the wings due to violent accelerations at the instant of pull-out of a vertical dive, caused the metal skin to distort and wrinkle the wing skin cover. On one occasion, radiating out from a central weakened location, the distortion spread out in a wave form, causing the aileron control to jam at the wing tips and resulted fatally for two airmen. From this brief discussion of wave form, we can see how these elementary principles are after all the basis of engineering design and how the theory is applicable to modern aircraft.

Many aircraft engine members, for instance the intake valves, are subjected to abrupt and frequent variations in temperature. This succession of changes that is developed within the members travels for-

(Continued on page 40)

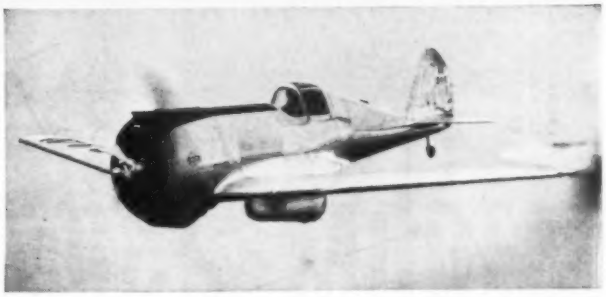


The giant Consolidated bomber landing after a test flight: Capable of 400 m.p.h. fully loaded

FRONTIERS

Highlights of the Latest Planes Produced For Use Here and Abroad

By ROBERT C. MORRISON



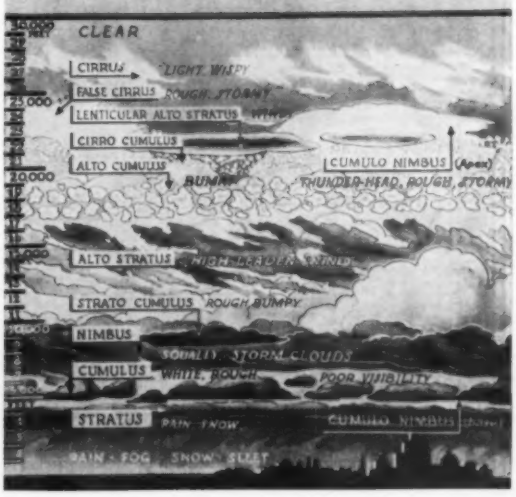
The Curtiss CW-21 climbs over 5,000 feet per minute with 1,000 hp.

The Messerschmitt 110, latest German pursuit plane designed to protect bombers

OUR recipe this month is mainly on how to prepare a Hitler stew a la American style . . . a dash of Curtiss and a Douglas here and there. It appears as though it will be Lockheeds that will really get the kettle boiling over there, however, as we hear rumor to the effect that it is not all peaceful twin-engined reconnaisance planes that will wend their way to England from the Lockheed plant. On the contrary, though Lockheed does not admit it, rumor says that they are working on a four-engined bomber for Great Britain . . . a version of the Lockheed Model 44 now abuilding for Pan-American Airways. It is a "small" four-engined airplane with plenty of that all-important speed which is what Great Britain needs in the way of a bombing plane for long expeditions into enemy territory. $1,700,000 now bristle on Lockheed's books as one of the sales for the "largest Lockheed ever built." Another order comes from Pan-American Airways totaling about $710,000 for three transports of similar design with an option on three additional planes that may be purchased at a later date. Though details are lacking on any four-engined bomber at this time, here is the dope on the Model 44 as sold to Pan-American.

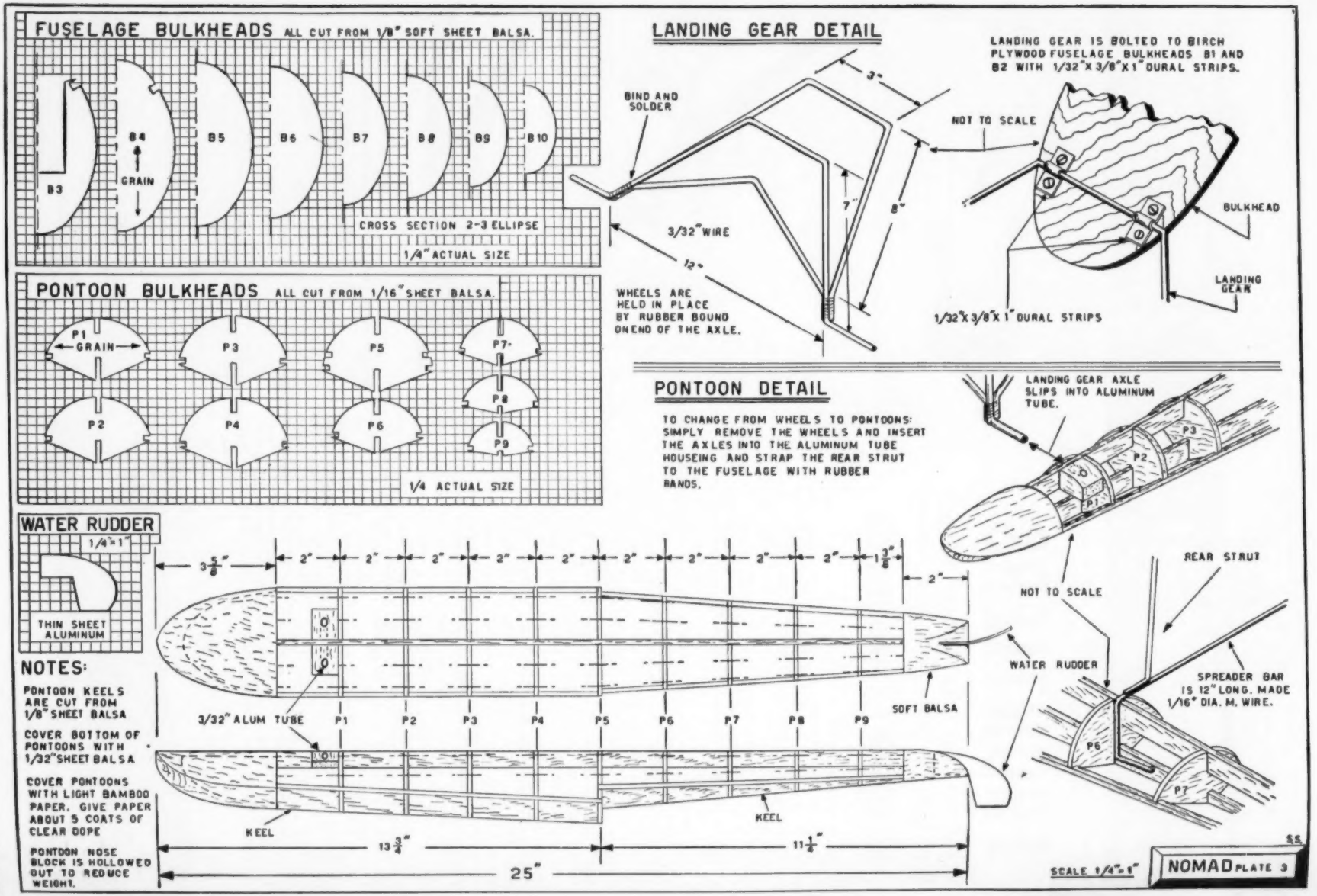
Single row Wright GR-1820 Cyclones are intended to power this airplane. Named the "Excalibur" the plane will top 300 m.p.h. with a cruising speed of 262 m.p.h. with 30 passengers, a ton of mail and crew of six on board. Turn the payload into bombs and give the crew machine guns and you have a good eye-opener for any early morning bombing raid. Weighing 40,000 pounds the airplane has a cruising range of 1500 miles . . . and if one of Hitler's cronies should blow one of the engines off, the ship will still be able to fly at around 200 m.p.h. in a hurry-scurry trip back to the home base. But Pan-American has no feud with Hitler as yet; it will be the Andes that will be bothersome in her case. The Model 44 has its best cruising speed at 19,000 feet, and Pan-American will have most troubles in flying the ships at high altitudes and also of convincing the sun-worn natives that her planes are not comets from heaven,

(Continued on page 48)

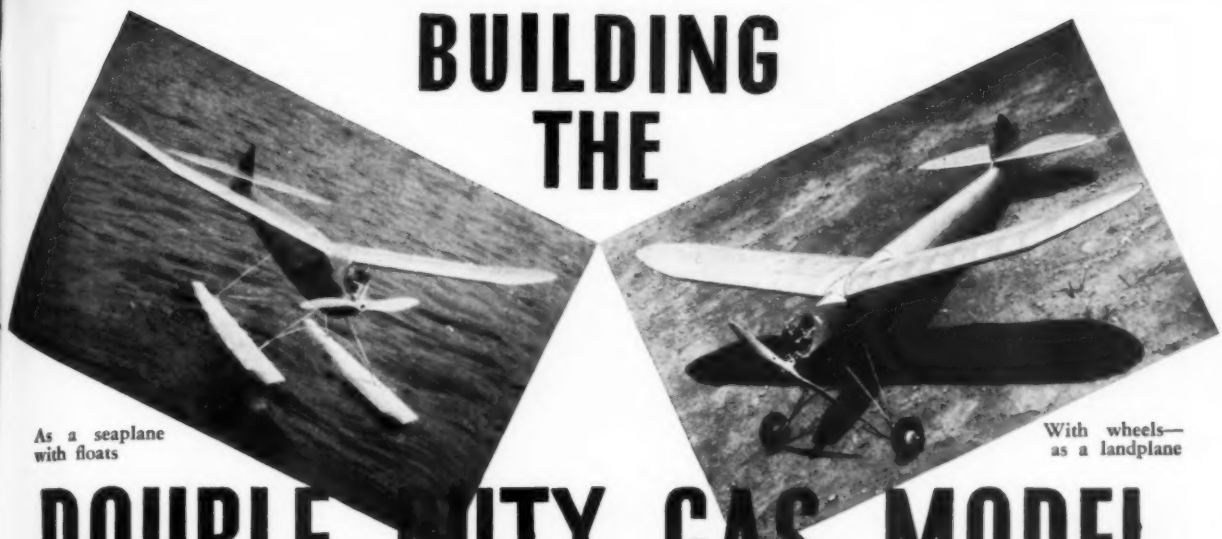


The new Pan-American Boeing Strato-Clipper, Flying Cloud; the first supercharged, sealed-cabin air transport. It will operate in the stratosphere above turbulent weather. The chart shows the various types of clouds and the resulting weather at all levels up to the "weather free" area above 30,000 feet

One of Holland's latest long-distance bombers; the Fokker T-5, driven by two 925 hp. engines at 257 m.p.h. (Thorell)


FUSELAGE BULKHEADS ALL CUT FROM 1/8" SOFT SHEET BALSA.
B3
B4
GRAIN
B5
B6
B7
B8
B9
B10
CROSS SECTION 2-3 ELLIPSE
1/4" ACTUAL SIZE
PONTOON BULKHEADS ALL CUT FROM 1/16" SHEET BALSA.
P1
GRAIN
P2
P3
P4
P5
P6
P7
P8
P9
1/4 ACTUAL SIZE
LANDING GEAR DETAIL
BIND AND SOLDER
3"
7"
8"
3/32" WIRE
12"
WHEELS ARE HELD IN PLACE BY RUBBER BOUND ON END OF THE AXLE.
LANDING GEAR IS BOLTED TO BIRCH PLYWOOD FUSELAGE BULKHEADS B1 AND B2 WITH 1/32"X3/8"X1" DURAL STRIPS.
NOT TO SCALE
BULKHEAD
LANDING GEAR
1/32"X3/8"X1" DURAL STRIPS
PONTOON DETAIL
TO CHANGE FROM WHEELS TO PONTOONS: SIMPLY REMOVE THE WHEELS AND INSERT THE AXLES INTO THE ALUMINUM TUBE HOUSEING AND STRAP THE REAR STRUT TO THE FUSELAGE WITH RUBBER BANDS.
LANDING GEAR AXLE SLIPS INTO ALUMINUM TUBE.
P1
P2
P3
WATER RUDDER
1/4"=1"
THIN SHEET ALUMINUM
3 5/8"
2"
1 3/8"
3/32" ALUM TUBE
SOFT BALSA
KEEL
13 3/4"
11 1/2"
25"
NOTES:
PONTOON KEELS ARE CUT FROM 1/8" SHEET BALSA
COVER BOTTOM OF PONTOONS WITH 1/32" SHEET BALSA
COVER PONTOONS WITH LIGHT BAMBOO PAPER. GIVE PAPER ABOUT 5 COATS OF CLEAR DOPE
PONTOON NOSE BLOCK IS HOLLOWED OUT TO REDUCE WEIGHT.
NOT TO SCALE
REAR STRUT
WATER RUDDER
SPREADER BAR IS 12" LONG. MADE 1/16" DIA. M. WIRE.
P6
P7
SCALE 1/4"=1"
NOMAD PLATE 3

BUILDING THE



As a seaplane with floats

With wheels—as a landplane

DOUBLE DUTY GAS MODEL

By SIDNEY STRUHL

HOW many times have you wished that you had a hydro gas model while you were lazily rowing a boat or paddling a Kayak around a lake created to be the perfect body of water on which to fly gas job hydros? We know that this has often been our wish.

However many of these wishers realize that they can't afford both the time and the money that a gas model for water flying would cost. Yet they keep saying and wishing to themselves, "Gee, if I only had a ship that I could use for contest work and whenever I wanted I could change it into a hydro with just a little bit of trouble . . . Gee . . ."

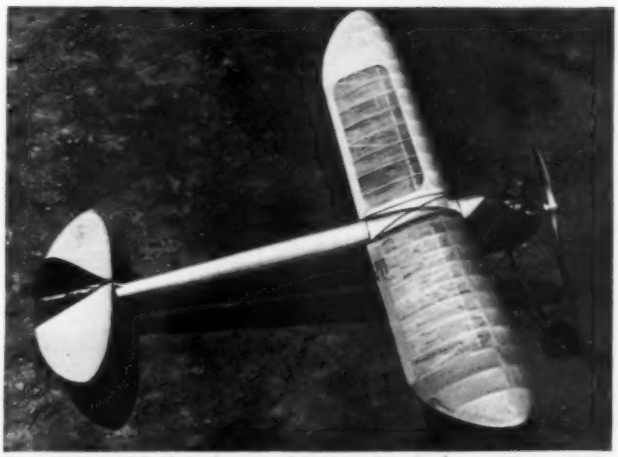
Well, Wishers, wish no more for your wishes are answered. For we present this month, the "NOMAD"—a Double Duty Gas Model.

The "NOMAD" is a convertible land- and seaplane; the complete change from land to seaplane taking only three minutes and requires no tools whatsoever!

Not only does the "NOMAD" possess this quality of conversion, but also incorporates in its design every single quality that is desirable for the most strenuous type of contest work. Now don't you think that we have answered your wishes?

Now let's tell you about the design and some of the experiences of the "NOMAD."

The whole set-up of the ship is for plenty of speed and stability. To attain great speed and yet keep a very high angle of climb, the wing was placed directly at the top of the fuselage instead of above the fuselage and a Grant "X" airfoil was used. At first you will say, "But the Grant "X" is a slow airfoil . . ." but you will really be surprised at what happens with the set-up that is in the "NOMAD." The ship zooms off the ground with terrific speed and reaches for the sky with just that steep angle of climb that the Grant "X" was created for. Although as a hydro, she needs a longer run to take off, but after planing for a few yards and breaking clear from the water, the little ship heads for the clouds in just the same manner as it does when it is equipped with wheels.



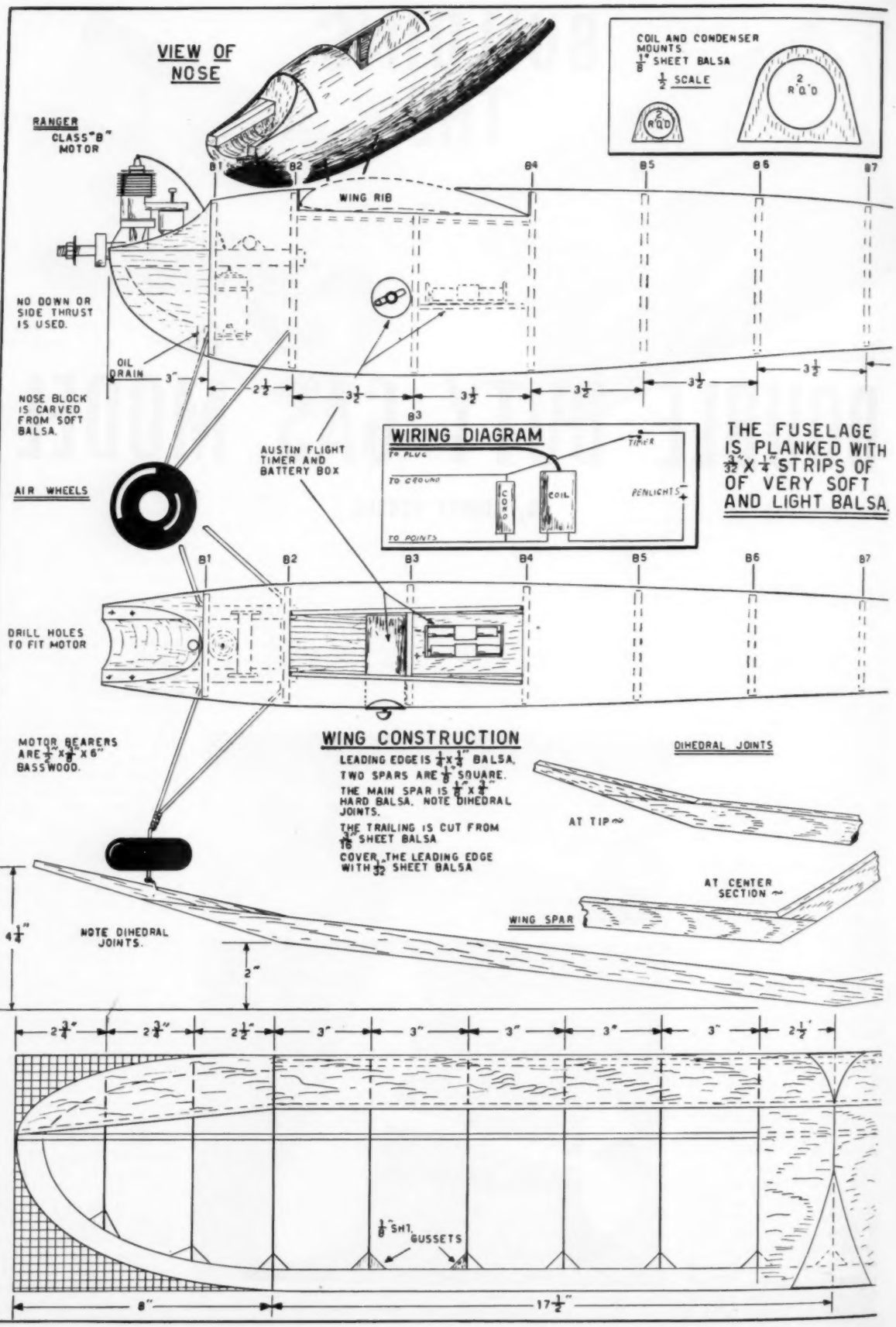
Two views which show its graceful streamline fuselage, efficient high-aspect ratio wings and sturdy construction

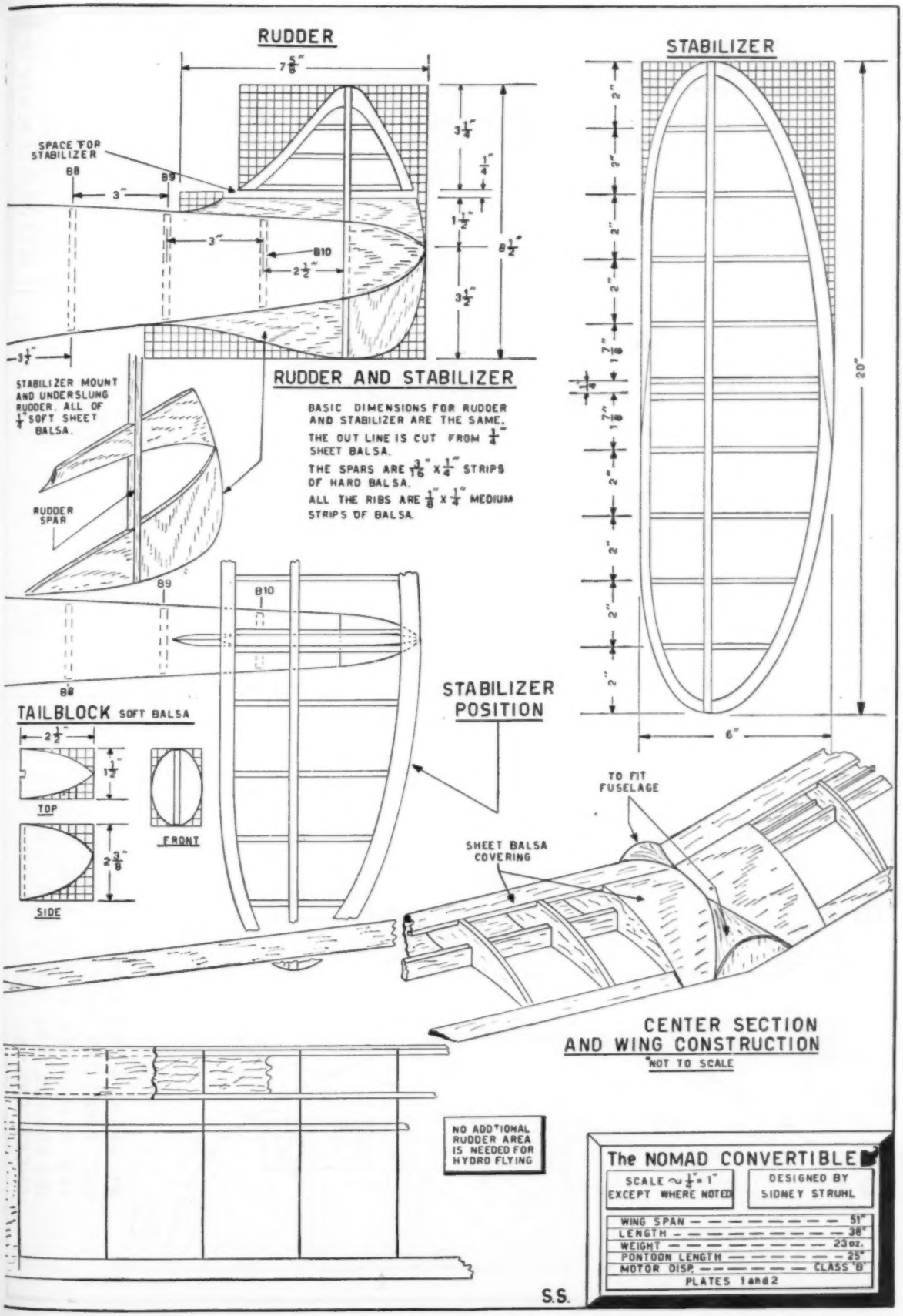
Double dihedral was installed in the wing to make sure there was not any slipping when the ship was climbing in tight spirals. The fuselage employs monocoque construction to take all the punishment that there is to take with contest and hydro flying. Note the long moment arm of the fuselage to help increase stability. The stabilizer is of generous area and is placed quite high in the rudder, out of the water spray. The model is so designed that you don't have to add any rudder area when you fly as a seaplane, as is the usual case; there is ample rudder area and yet not too much for land flying. The landing gear is placed well forward to protect the motor and nose from damage.

Nothing much can be said about the contest work that the "NOMAD" has done because it has only been to one contest and it flew out-of-sight in the morning on a test flight. But plenty can be said about the water flying that the model has done. During the summer of '39 the author flew her on an average of five flights a day, almost every day, during the months of July and August, or about a total of about 300 flights. The only damage during this entire time was a few rips in the wings and tail.

Because the lake from which the author flew his model was quite small, on many flights the ship would fly off the lake and land in a nearby forest or alight on top of a boat-house, or even land on the state road. But the only damage was a few rips in the covering and one broken prop when the ship hit a car. It is interesting to

(Continued on page 52)


VIEW OF NOSE
RANGER CLASS "B" MOTOR
COIL AND CONDENSER MOUNTS
1/8" SHEET BALSA
1/2 SCALE
2 REQ'D
2 REQ'D
WING RIB
B1
B2
B3
B4
B5
B6
B7
NO DOWN OR SIDE THRUST IS USED.
OIL DRAIN
3"
2 1/2
3 1/2
3 1/2
3 1/2
3 1/2
3 1/2
NOSE BLOCK IS CARVED FROM SOFT BALSA.
AUSTIN FLIGHT TIMER AND BATTERY BOX
WIRING DIAGRAM
TO PLUG
TO GROUND
TO POINTS
TIMER
COND
COIL
PENLIGHTS
THE FUSELAGE IS PLANKED WITH 3/32" X 1/4" STRIPS OF VERY SOFT AND LIGHT BALSA
AIR WHEELS
DRILL HOLES TO FIT MOTOR
MOTOR BEARERS ARE 1/4" X 3/4" X 6" BASSWOOD.
WING CONSTRUCTION
LEADING EDGE IS 1/2" X 1/4" BALSA.
TWO SPARS ARE 1/8" SQUARE.
THE MAIN SPAR IS 1/8" X 3/4" HARD BALSA. NOTE DIHEDRAL JOINTS.
THE TRAILING IS CUT FROM 1/16" SHEET BALSA
COVER THE LEADING EDGE WITH 1/32" SHEET BALSA
DIHEDRAL JOINTS
AT TIP
AT CENTER SECTION
WING SPAR
4 1/2"
NOTE DIHEDRAL JOINTS.
2"
2 3/4"
2 3/4"
2 1/2"
3"
3"
3"
3"
3"
2 1/2"
1/8" SHT. GUSSETS
8"
17 1/2"


RUDDER
SPACE FOR STABILIZER
B8
B9
B10
3"
2½"
3½"
1½"
¼"
8½"
STABILIZER
20"
6"
RUDDER AND STABILIZER
BASIC DIMENSIONS FOR RUDDER AND STABILIZER ARE THE SAME.
THE OUT LINE IS CUT FROM ¼" SHEET BALSA.
THE SPARS ARE 3/16" X ¼" STRIPS OF HARD BALSA.
ALL THE RIBS ARE ⅛" X ¼" MEDIUM STRIPS OF BALSA.
STABILIZER MOUNT AND UNDERSLUNG RUDDER. ALL OF ¼" SOFT SHEET BALSA.
RUDDER SPAR
TAILBLOCK SOFT BALSA
2½"
1½"
TOP
FRONT
2⅜"
SIDE
STABILIZER POSITION
TO FIT FUSELAGE
SHEET BALSA COVERING
CENTER SECTION AND WING CONSTRUCTION
NOT TO SCALE
NO ADDITIONAL RUDDER AREA IS NEEDED FOR HYDRO FLYING
The NOMAD CONVERTIBLE
SCALE ~ ½" = 1" EXCEPT WHERE NOTED
DESIGNED BY SIDNEY STRUHL
WING SPAN — 51"
LENGTH — 38"
WEIGHT — 23 oz.
PONTOON LENGTH — 25"
MOTOR DISP. — CLASS 'B'
PLATES 1 and 2
S.S.

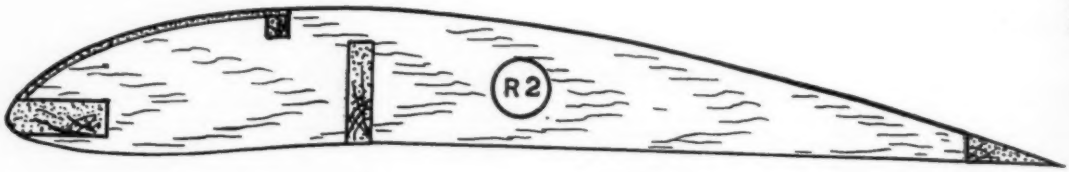
WING RIBS

ALL WING RIBS ARE CUT FROM 1/16" MEDIUM SHEET BALSA.

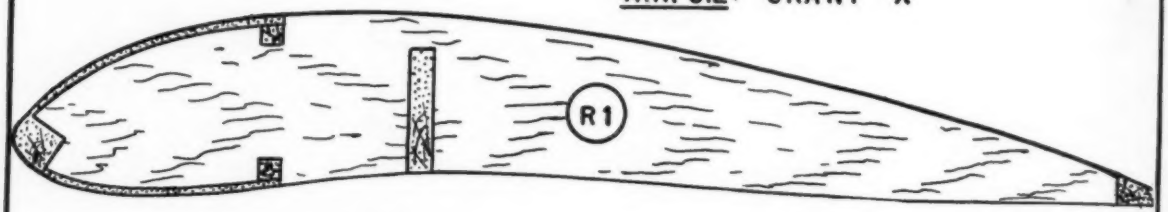
FULL SIZE

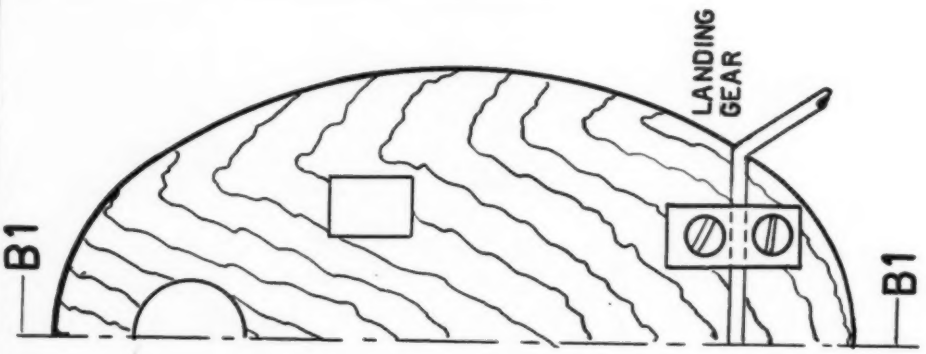
NOMAD PLATE 4

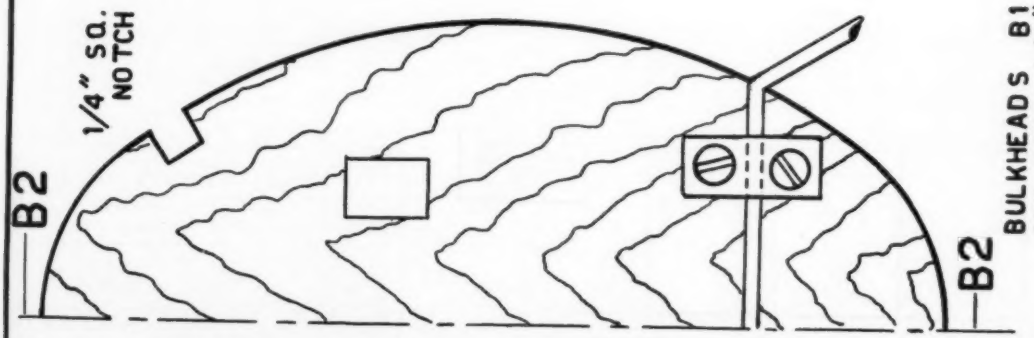
S.S.



AIRFOIL: GRANT "X"







BULKHEADS B1 AND B2 ARE CUT FROM 1/8" BIRCH PLYWOOD. THE REMAINDER OF THE FUSELAGE BULKHEADS ARE CUT FROM 1/8" SHEET BALSA.

Academy Of Model Aeronautics

A Division of the National Aeronautic Association

OFFICIAL MODEL AIRPLANE NEWS FROM ALL PARTS OF THE WORLD

National Meet

The dates of the 1940 National Model Airplane Meet have been set for the first week in July, probably with registration on the first or second, with the competition running through Saturday, July 6.

It is the feeling of Contest Board officials and Chicago *Times* leaders, the sponsors of the contest, that the stick model event should be included in the national competition. This is the recommendation made by the Academy at its conference last November. So once again the Mulvihill Trophy will be awarded in one of the three categories of the outdoor hand-launched stick event.

Among the suggestions received at headquarters regarding a qualifying contest for entrants from the Chicago area, was one advanced by John Ogilvie, scientific member of the Academy from New York City, who proposed that a minimum requirement be set up for all events which entrants from the Chicago area must equal or exceed in an N.A.A.-sanctioned competition between now and the National Meet.

The committees of the Academy now working on regulations to govern events at the National Meet include the Flying Scale Model Committee, whose chairman, Victor Fritz, of Philadelphia, is holding a "meeting-by-mail" session of his committee. The Radio Control Committee is also drawing up regulations for the radio control competition at the Nationals and Chairman Clinton B. DeSoto of the American Radio Relay League is being assisted in the work by his committee members. Among those on the committee is Walter Good of Kalamazoo, Mich., winner of the '39 event.

SWGMA Convention
E. F. Burgdorf of Houston Named President of Group

The Southwest Gas Model Association's third annual convention of model airplane builders and engineers concluded last night at the Breakers Hotel with election of E. F. Burgdorf of Houston as president and other officers and the selection of Fort Worth as the 1941 convention city, the date to be announced later.

Several adjustments were made in model airplane contest rules during the long session yesterday afternoon, which extended over a continuous five-hour period, but President F. W. Cale of Dallas, who presided over his third convention, declared the Corpus Christi session was conducted with considerably more dispatch than previous meetings.

Contests set yesterday at the request of delegates present were: College Station, May 12; Graham, May 26; Oklahoma City, June 9; San Antonio, June 23; Houston, July 21; Dallas, August 4; Fort Worth, August 18; and Corpus Christi, September 1. A brief meeting of Dallas and Fort Worth delegates and SWGMA members resulted in the two cities proposing a large contest either on August 4 or August 18. Other cities not represented yesterday will be permitted to select dates not designated.

Jerry Heller of San Antonio, world's record holder for Class "C" models, set during the third annual *Caller-Times* contest here August 13, 1939, was elected to the vice-presidency, an office created yesterday to which the modeler bringing greatest credit to the association will be selected.

Mrs. Herbert Fisher of San Antonio was elected secretary and treasurer, succeeding Ralph Pressler, who helped President Cale organize the association and has served as secretary and treasurer for two terms. Byron Buzbee of Corpus Christi was elected publicity director of the SWGMA, an office created this year. President-elect Burgdorf was named official state National Aeronautic Association contest director and the SWGMA's candidate for regional N.A.A. vice-president. All of the officers were elected by acclamation. Floor Delegate Willie Gunn withdrew the name of Bob Abey of Fort Worth from the office of presidency, leaving Burfdorf the only candidate. Convention bids were submitted by Houston and Mineral Wells, but on the personal invitation of J. Monroe Sweeney, representing the Fort Worth Hotel Men's Association, and letters from the Fort Worth mayor and civic organizations, delegates unanimously voted to hold the 1941 meeting in Fort Worth.

Committee chairmen reporting were: 1. Rules by Pressler; 2. Constitution and by-laws, by Burgdorf; 3. Contests and activities, by Johnny Clemons of Dallas; 4. Awards, by Sid Smart of Dallas; and 5. Nominating, by Burnell Brown of Dallas. N.A.A. rules will be followed, plus a 25-cent SWGMA entry fee at SWGMA-sanctioned contests, an 11 a.m. entry deadline, no relationship of contestants and officials, no local contest official competing, adequate runways and disqualification for unsportsmanlike conduct in contests.

Clemons was authorized to devise a standard contest kit, which includes blanks, charts, etc., and his committee recommended an order of events, correspondence contests and propose an invitation to Academy of Model Aeronautics to the southwest for the 1941 convention.

The awards committee recommendation to set a "tops" for first place prizes of $30 cash, or $25 cash and a trophy, was approved by floor delegates. This would eliminate "professionalizing" contests, Chairman Smart declared.

A $15 expense account for the secretary, one delegate from each city and a $15 maximum for speakers and guests, were constitution and by-laws recommendations adopted by the convention.

Treasurer Pressler reported the association in good financial shape with 208 active members.

With 95 delegates registered during the two days Saturday and Sunday, the visitors were entertained by members of the Corpus Christi N.A.A. and SWGMA Club with a barbecue chicken supper Saturday night and a boat ride Sunday morning, arranged by the chamber of commerce and Capt. R. H. Hall. Ab Walker of Corpus Christi was convention chairman.

Floor delegates were Willie Gunn of Fort Worth, Tommy Givens of Graham, Herbert Fisher of San Antonio, Bob Barlow of Oklahoma City, Burgdorf of Houston, Brown of Dallas, C. S. Morse of College Station, R. L. Kirkley of Austin, Robert Osburn of Galveston, Garver Murray of Harlingen, and S. M. Udden of Corpus Christi.

Zaic Lauds New Academy

It is with considerable pleasure that the A.M.A. presents the following commentary by Frank Zaic, distinguished model aeronautics authority and internationally-known model aircraft designer and flyer. Mr. Zaic has been active in Academy circles since its inception.

"'By, For and Of Model Builders' is a phrase we have tried to make a reality for many years. The present Academy status is the closest approach to this ideal yet achieved.

"It was eight years ago that service-spirited model builders and leaders decided that something concrete should be done to organize an association which would act as governing and representing body for the model builders. During the intervening years the organization progressed by stops, push and pull. But on it went despite many individual disappointments and discouragements. It is therefore gratifying to those of us who were in at the 'beginning' to see the original thought finally emerge as the main theme of the present organization.

"It is evident that we have just begun the work and that there is a tremendous job still ahead of us. But work will be a pleasure as we will be working for ourselves and others similarly interested."

Committee Appointments

President Edward Roberts announces the appointment of Roy Marquardt, Pasadena, Calif., and Frank Zaic, New York City, to the A.M.A. Board of Admissions. These two will serve on the board along with the past presidents, Willis C. Brown, Boston, Mass., and Albert Lewis, Washington,

(Continued on page 34)

GAS LINES

Gas Model News From All Parts of the World

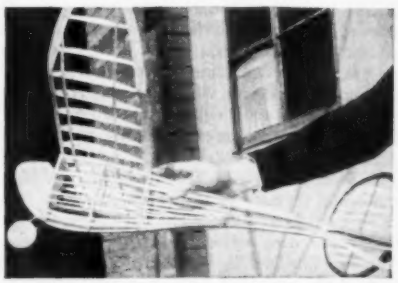
Pict. 1. A Weather's "Mystery Man" and "Mystery Maid" hold a match meet in California

THE coming season gives promise of a great variety of designs in gas models. The new rules do not encourage builders to construct merely one type in order to win contests; consequently, gas modelers have taken advantage of this fact and glimpses of a number of private gas model workshops give evidence that some unique, new types of ships are being made ready. Some are rather startling, so do not be surprised to see a great assortment of peculiar looking craft take the air during some of our coming meets. They also give promise of fine performance.

This great increase in the scope of designs is evidence of the wisdom of the new rules established by the Academy. We wish to drop a hint here to our readers to look for a new interesting type of plane, the plans of which will shortly appear in MODEL AIRPLANE NEWS. Yes, it is a gas job and one that will perform with the "best of 'em." It is entirely different in design and you can expect it to exceed the fantastic dreams of the most ardent modeler. The fact it is unique and different does not make it difficult to construct; it may be built in a very short time with no more effort than the average simple gas model.

Pict. 2. Leon Shulman and his "latest"

Pict. 4. A "rubber model" turns to "gas"



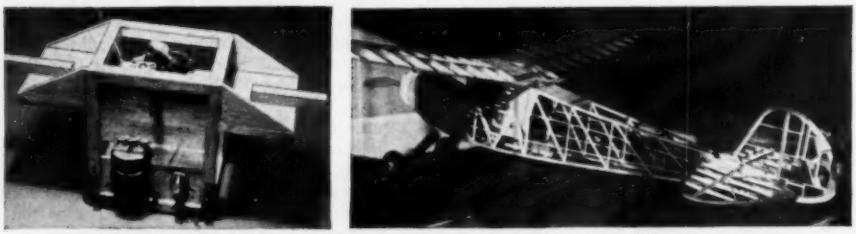
Pict. 3. Kutaj's Class A "Sky-Rocket"

Pict. 5. Walter Eggert and his soaring gas job

Great activity has been taking place through many parts of the country during the winter months. In a number of localities, such as California, which enjoys warm, clear weather all year around, there has been no cessation of flying. D. S. Hallacy, Jr., corresponding secretary of the San Diego Aeroneers of 3375 Dale Street, San Diego, Cal., tells something of his organization's activities. It has a club field at which regular contests are held and in one meet held during January there was a field of 40 contestants of all ages. In addition to the regular endurance event there was a special one for spot landings. One of the interesting features was a match between Weather's "Mystery Man" and Mrs. Davis' "Mystery Maid"—Weather's defeated his fair opponent.

Picture No. 1 shows you a glimpse of the two machines in simultaneous flight. First place in the duration event was won by Bob Seeley, president of the club. Second and third went to Don Jones and Harold Strawn, respectively. Joe Riley took first place in the

(Continued on page 58)



Pict. 6 and 7. A light, compact radio receiving unit and model it operates

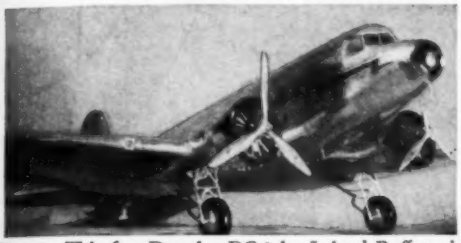
Pict. 8. Compton Winged Tartar Gas Model Club of California

Pict. 9. Oklahoma City Gas Model Assn. and planes

Pict.1. A scale Vought V-143-A by Merlin Dull

Air Ways

What Air Ways Club Members Are Doing To Increase Their Knowledge Of Aviation



Pict. 2 This fine Douglas DC-2 by Leland Ruffner is completely covered with Metal and has retractable landing gear

THE rapidity with which events are taking place in the model field makes it interesting to note the trend of these activities.

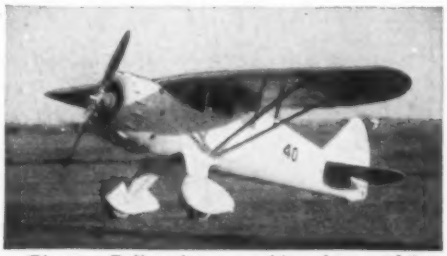
Before the advance of the gas model a great variety of contest designs appeared with each succeeding year. Now, however, gas models are occupying the attention of many designers and only a few of the experts are concentrating on the production of rubber powered contest ships. Few new designs for this type of model, having merit, have been produced lately, many builders being satisfied with building copies of designs that have won contests, such as Korda's model. Apparently the fields of models that are growing are the gas model field and the scale model field.

Rubber powered contest models deserve more consideration than they are receiving at the moment. Though it is not apparent, it is actually more difficult to design a superior rubber duration plane than a winning gas model. Of course the operation and flying of the gas model is more involved. Nevertheless, the concentrated weights tend to provide naturally a more stable airplane than it is possible to build with a rubber motor power. The extended weight of a rubber motor provides a stability problem which requires special ability and technique in respect to design. More careful adjustment is required in order to obtain the type of flights necessary to win contests.

Consequently we will look forward with the greatest of pleasure to receiving pictures of rubber powered contest models, which may be printed in this column. In sending such pictures be sure that they are clear and distinct and are taken against a background which does not confuse the detail of the model.

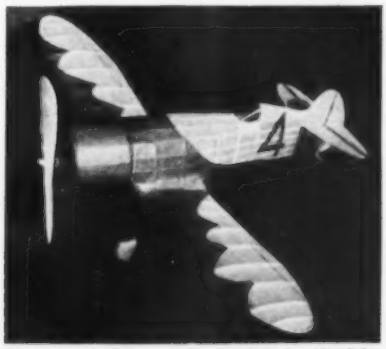
Perhaps the war has stimulated desire and ability of model builders to produce exceptionally fine scale models. At least this may be the explanation for the large number of photos of this type of ship we have received recently, a few of which appear on this page.

(Continued on page 62)



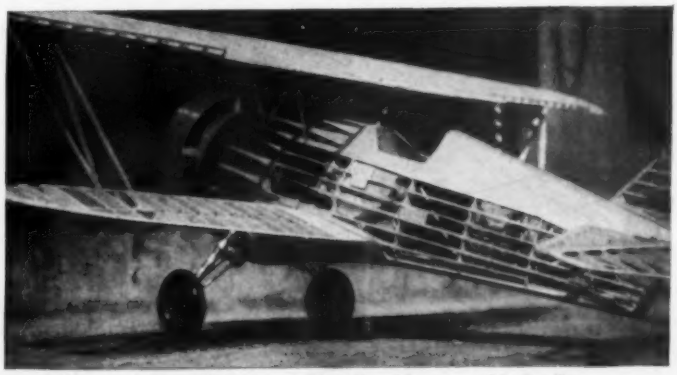
Pict. 3. Believe it or not, it's only a model

Pict. 5 Kiely Primaris, Schenectady Aeroneers Champion, with his ship and the trophy it won

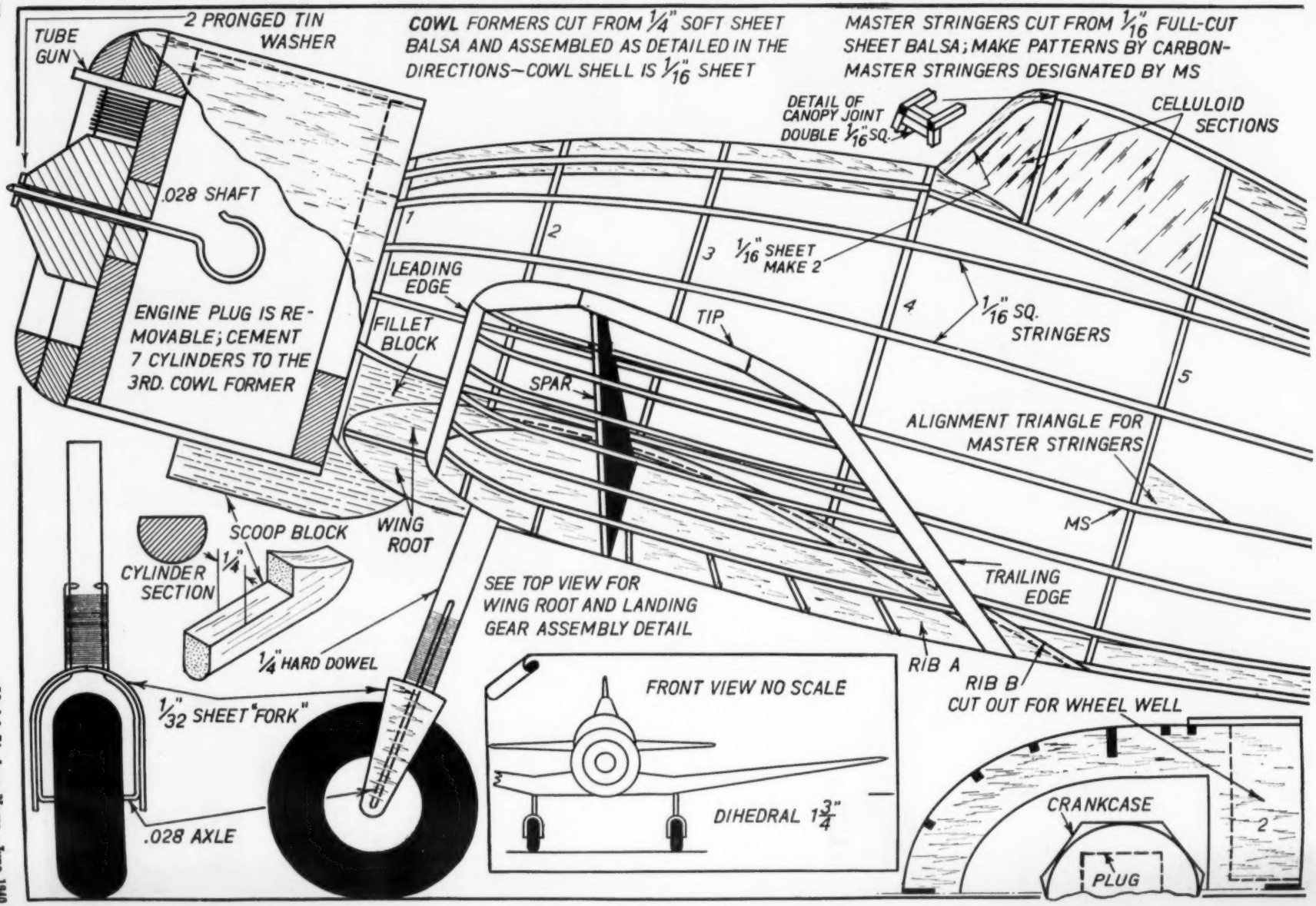


Pict. 4. A flying scale GeeBee inspired by Lowel Bayles and built by Allan Schultman

Pict. 7. The Franklin Simon Aero Club



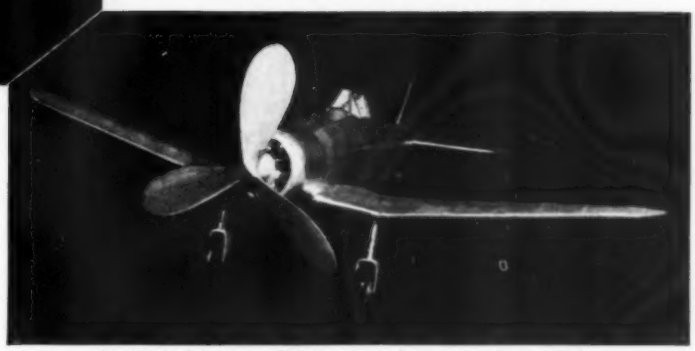
Pict. 6. A beautiful all-metal Hawk with retractable landing gear


COWL FORMERS CUT FROM 1/4" SOFT SHEET BALSA AND ASSEMBLED AS DETAILED IN THE DIRECTIONS—COWL SHELL IS 1/16" SHEET
MASTER STRINGERS CUT FROM 1/16" FULL-CUT SHEET BALSA; MAKE PATTERNS BY CARBON- MASTER STRINGERS DESIGNATED BY MS
2 PRONGED TIN WASHER
TUBE GUN
.028 SHAFT
ENGINE PLUG IS REMOVABLE; CEMENT 7 CYLINDERS TO THE 3RD. COWL FORMER
DETAIL OF CANOPY JOINT DOUBLE 1/16" SQ.
CELLULOID SECTIONS
1
2
3
1/16" SHEET MAKE 2
4
1/16" SQ. STRINGERS
5
LEADING EDGE
FILLET BLOCK
TIP
SPAR
ALIGNMENT TRIANGLE FOR MASTER STRINGERS
MS
SCOOP BLOCK
WING ROOT
CYLINDER SECTION
1/4"
TRAILING EDGE
SEE TOP VIEW FOR WING ROOT AND LANDING GEAR ASSEMBLY DETAIL
1/4" HARD DOWEL
RIB A
RIB B
CUT OUT FOR WHEEL WELL
1/32" SHEET "FORK"
FRONT VIEW NO SCALE
DIHEDRAL 1 3/4"
CRANKCASE
PLUG
2
.028 AXLE

Build and Fly The Fiat Pursuit

Complete Plans and Instructions Showing You How to Create a Flying Replica of a Modern Italian Fighter

"Looks" and flying qualities are combined



Its 27 inch span and large prop insure consistent flights

By WILLIAM WINTER

GERMANY has her Messerschmitt and Heinkel; Britain her Spitfire and Hurricane; France her Morane, Nieuport, Dewoitine et al; the United States the sturdy Seversky and Curtiss. And now Italy is a member of the elite, since her new 840 hp. Fiat-powered, all-metal Fiat G-50 can easily hurdle the 300 m.p.h. mark.

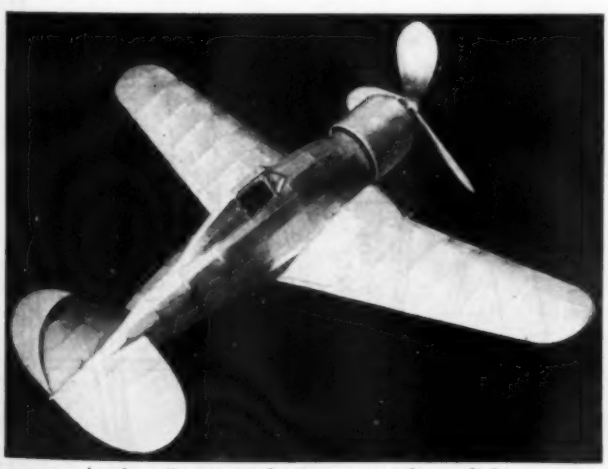
This miniature belongs to the heavier type of flying scale model. Featured in its design is the rugged structure necessary for a long-lived flying model. The little ship will not fly out of sight as a lightly fabricated flying scale may, but it is well balanced and will turn in many commendable flights.

Construction Directions—Fuselage

The bulkheaded fuselage is assembled by the master-stringer method. First cut the bulkheads from 1/16″ sheet balsa. Grade should be medium, wood selected for full cut. This will facilitate alignment during assembly. However, cut only the main notches for the master stringers, marking positions of auxiliary stringer notches. Using carbon paper, mark master stringers on hard, full-cut 1/16″ sheet balsa and cut out. Cement bulkheads 3, 4 and 5 on both sides of master stringers. Note that these two stringers break upward at bulkhead 5 and are held in alignment by small balsa triangles. When dry add bulkheads 1, 2 and 6 through 10. Bulkhead 9 is two-ply and supports the .028 rear hook. Hook reenforcement is a strip of 1/8″ x 3/8″. Work top and bottom master stringers into position and cement. The 1/16″ square auxiliary stringers are added by cutting the small notches with a razor sliver as work progresses.

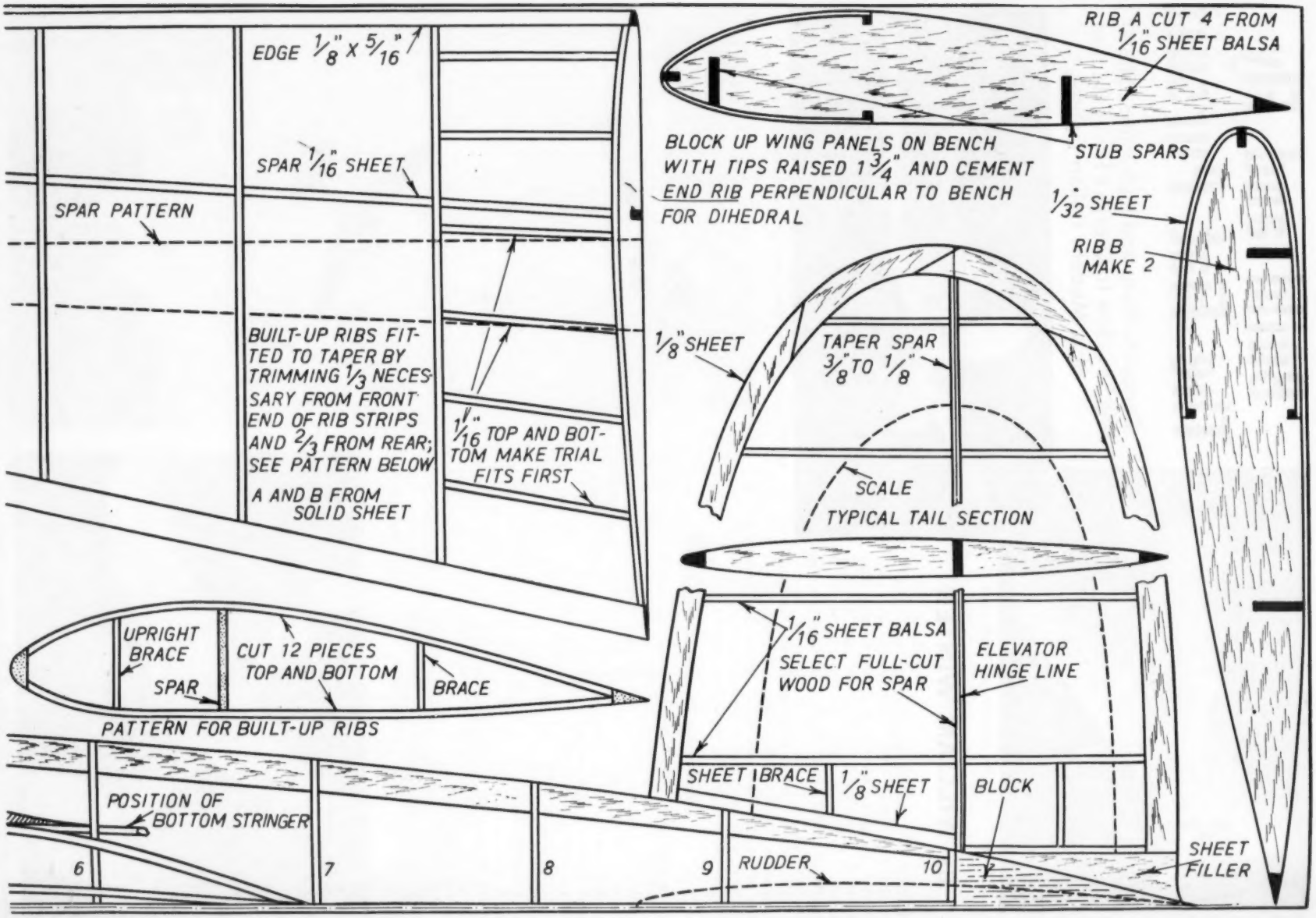
It is now necessary to assemble the wing roots. Build these in a form on the bench. Structure is conventional wing practice. Stub spars (1/16″ x 3/8″) are two. Leading *(Continued on page 46)*

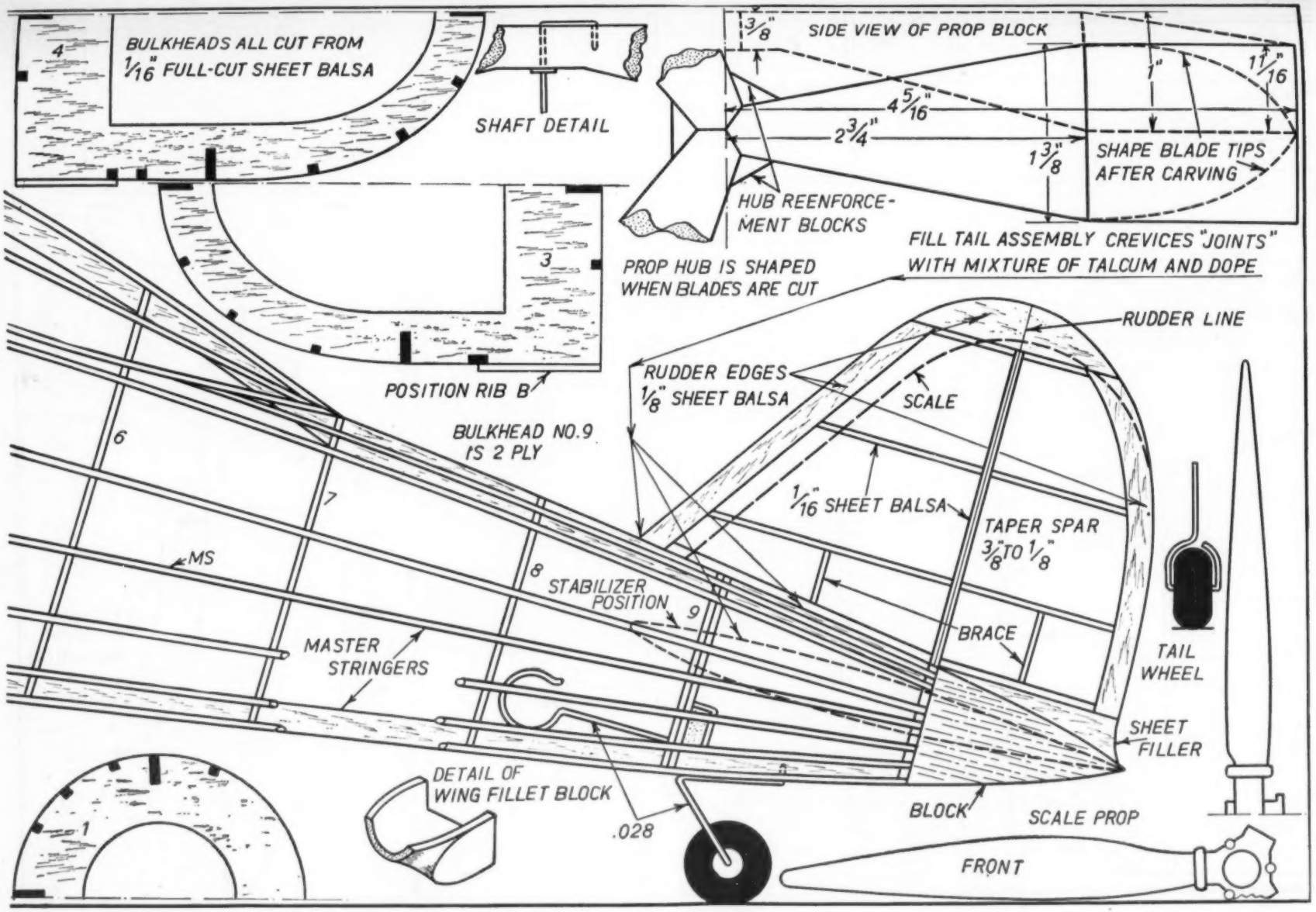
The model is realistic and climbs steadily

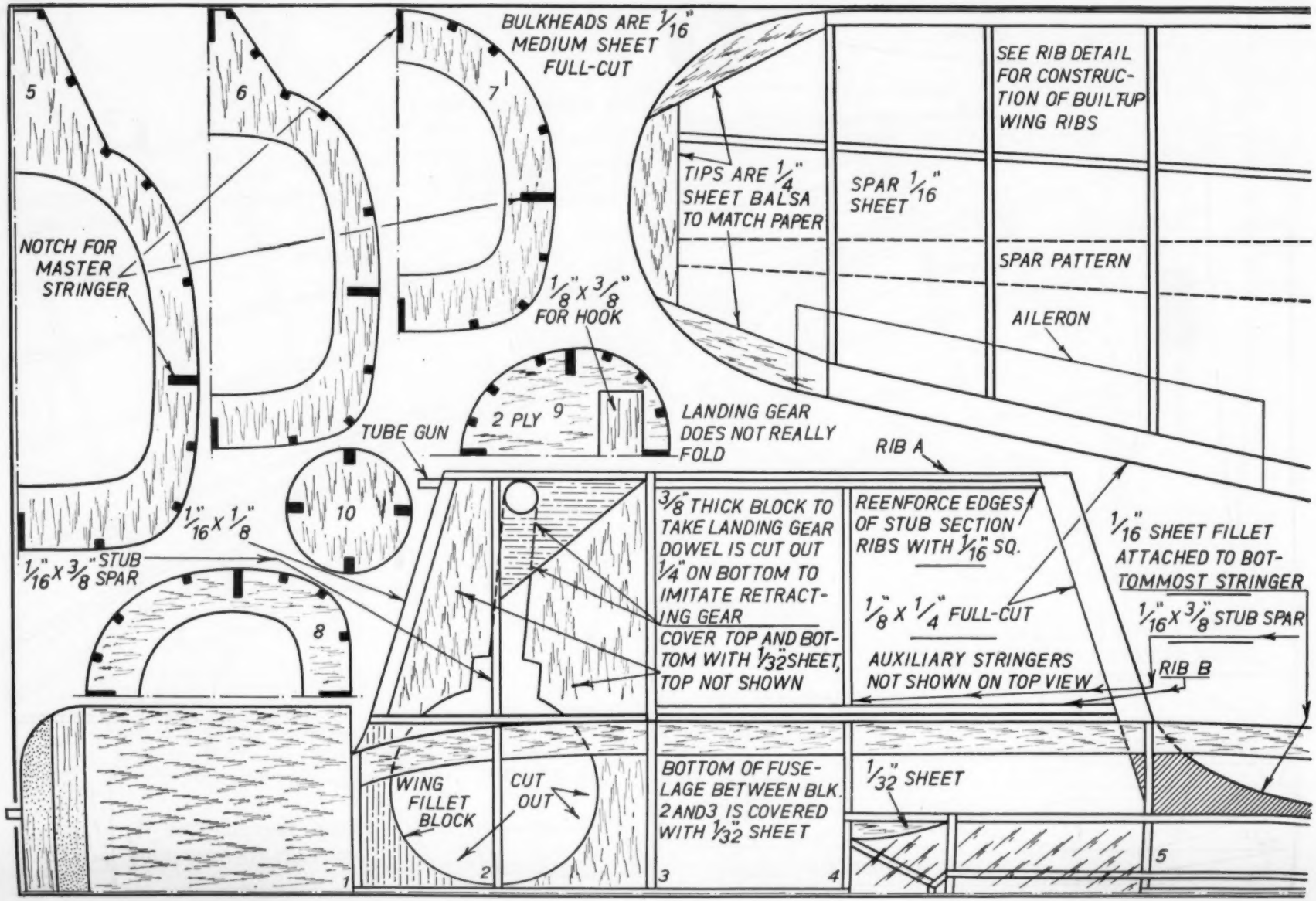


Ample tail areas make it very steady in flight

Gaining altitude for a long flight after launching


EDGE 1/8" x 5/16"
SPAR 1/16" SHEET
SPAR PATTERN
BUILT-UP RIBS FITTED TO TAPER BY TRIMMING 1/3 NECESSARY FROM FRONT END OF RIB STRIPS AND 2/3 FROM REAR; SEE PATTERN BELOW
A AND B FROM SOLID SHEET
1/16" TOP AND BOTTOM MAKE TRIAL FITS FIRST
UPRIGHT BRACE
SPAR
CUT 12 PIECES TOP AND BOTTOM
BRACE
PATTERN FOR BUILT-UP RIBS
POSITION OF BOTTOM STRINGER
6
7
8
9
RUDDER
10
RIB A CUT 4 FROM 1/16" SHEET BALSA
STUB SPARS
BLOCK UP WING PANELS ON BENCH WITH TIPS RAISED 1 3/4" AND CEMENT END RIB PERPENDICULAR TO BENCH FOR DIHEDRAL
1/32" SHEET
RIB B MAKE 2
1/8" SHEET
TAPER SPAR 3/8" TO 1/8"
SCALE
TYPICAL TAIL SECTION
1/16" SHEET BALSA SELECT FULL-CUT WOOD FOR SPAR
ELEVATOR HINGE LINE
SHEET BRACE
1/8" SHEET
BLOCK
SHEET FILLER


BULKHEADS ALL CUT FROM 1/16" FULL-CUT SHEET BALSA
4
SHAFT DETAIL
3/8"
SIDE VIEW OF PROP BLOCK
4 5/16"
2 3/4"
1 3/8"
1"
1 1/16"
SHAPE BLADE TIPS AFTER CARVING
HUB REENFORCE-MENT BLOCKS
PROP HUB IS SHAPED WHEN BLADES ARE CUT
FILL TAIL ASSEMBLY CREVICES "JOINTS" WITH MIXTURE OF TALCUM AND DOPE
3
POSITION RIB B
BULKHEAD NO.9 IS 2 PLY
RUDDER LINE
RUDDER EDGES 1/8" SHEET BALSA
SCALE
6
7
1/16" SHEET BALSA
TAPER SPAR 3/8" TO 1/8"
MS
8
STABILIZER POSITION
9
BRACE
TAIL WHEEL
MASTER STRINGERS
SHEET FILLER
DETAIL OF WING FILLET BLOCK
1
.028
BLOCK
SCALE PROP
FRONT


BULKHEADS ARE 1/16" MEDIUM SHEET FULL-CUT
SEE RIB DETAIL FOR CONSTRUCTION OF BUILTUP WING RIBS
TIPS ARE 1/4" SHEET BALSA TO MATCH PAPER
SPAR 1/16" SHEET
SPAR PATTERN
AILERON
NOTCH FOR MASTER STRINGER
1/8"X 3/8" FOR HOOK
2 PLY
TUBE GUN
LANDING GEAR DOES NOT REALLY FOLD
RIB A
1/16"X 1/8"
1/16"X 3/8" STUB SPAR
3/8" THICK BLOCK TO TAKE LANDING GEAR DOWEL IS CUT OUT 1/4" ON BOTTOM TO IMITATE RETRACTING GEAR
COVER TOP AND BOTTOM WITH 1/32" SHEET, TOP NOT SHOWN
REENFORCE EDGES OF STUB SECTION RIBS WITH 1/16" SQ.
1/8" X 1/4" FULL-CUT
AUXILIARY STRINGERS NOT SHOWN ON TOP VIEW
1/16" SHEET FILLET ATTACHED TO BOTTOMMOST STRINGER
1/16"X 3/8" STUB SPAR
RIB B
WING FILLET BLOCK
CUT OUT
BOTTOM OF FUSELAGE BETWEEN BLK. 2 AND 3 IS COVERED WITH 1/32" SHEET
1/32" SHEET
1
2
3
4
5
6
7
8
9
10

The Army's Flying Umbrella

By DOUGLAS J. INGELLS

The Ryan "Dragonfly" YO-51 called the Flying Umbrella because of its high wing and large flap area

IT WAS a surprised group that recently stood on the ramp at Wright Field and watched Maj. Stanley M. Umstead, dean of the army's test pilots, "float" to earth in the Ryan YO-51; Uncle Sam's "Flying Umbrella"—the latest type observation airplane in the air corps. The ship was brought to the field in Dayton, Ohio, to undergo the rigid test program at the hands of test pilots in the flying branch of the Materiel Division.

The first surprise came when the group saw that Maj. Umstead was not flying the giant XB-24, the new Consolidated bomber. Some of the group had expected this because the job of flying the new four-engined planes to Wright Field from their West Coast birthplaces usually is Maj. Umstead's assignment! He has flown all of the "Flying Fortress" experimental models to Wright Field on their initial flights.

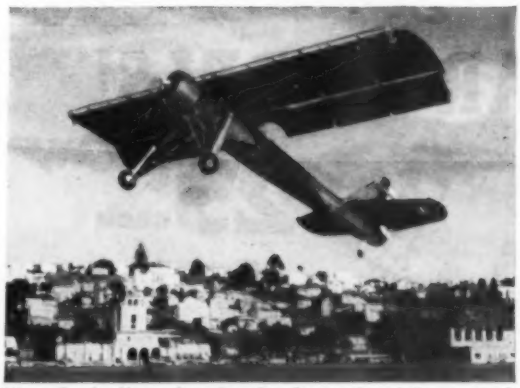
But it was no high-speed giant that he flew on this particular day. And that was the biggest surprise of all, for those who saw the new plane as it came in over the field didn't believe "there could be such an airplane."

The plane came in from the South; Louisville, Ky., was his last stop before Maj. Umstead left for Dayton. It made a complete circle of the field. In the air it looked like any ordinary monoplane with a great similarity to the high-wing Douglas observation type.

The ship appeared to have considerable speed as it made the circle of the field and observers began to wonder about the "slow" speed that had been indicated in reports of the plane. But Maj. Umstead was just edging them on.

Finally he put the small ship through its paces and when he was through there was no doubt about it; this new Ryan plane was the slowest, laziest flying machine since the days when 35 m.p.h. in an airplane was a world's record.

The famed test pilot brought the ship just over the crowd of newspapermen, photographers and field officers and engineers, at about 100 foot altitude, going about 90 m.p.h. When he was almost directly above them he "put on the brakes" and the ship seemed to actually come to a standstill in the air.



Note the leading edge slot that keeps the airflow smooth

It takes off in a steep climb and lands nearly vertically with little landing run

Maj. Umstead, the army test pilot, at the controls. Note the hinge mechanism of the leading edge slot

There was amazement even in the eyes of veteran pilots when they saw what happened. The ship's wing suddenly opened up on the leading edge as a "brake" flap appeared, and at the same time a trailing edge flap "slid out of the wing" adding, it seemed, at least two feet to the chord of the wing and increasing its camber to a greater lift coefficient.

That was the way it looked from the ground as the Ryan's unique features went into operation. Then the ship settled to earth, virtually a "floating umbrella." It settled slower than a parachute.

When the wheels touched the ground there was no roll to speak of, the ship merely bounced a little, shook itself as the tires relieved the impact, and there it was on the ground. You could land one of those things in your backyard or on top of the garage. At least that was the consensus of opinion from those on the ground. They had never seen an autogyro do any better.

But that was just the beginning. Maj. Umstead gave press photographers and movie men a big smile and waved his hand, then he gunned the motor for a take-off. This climaxed the performance and the veteran test pilots—400 mile-an-hour experts and designers—grinned to themselves and shook their heads —"it just ain't natural."

When the motor revved up the little Ryan shook herself as every plane does just before taking off, and then you could see the front slot in the leading edge of the wing open and as the blast from the prop hit the opening the ship lifted its nose into the air. The rear "flap" that looks more like an extended portion of the wing and operates the same way, gave the wing almost double its original wing width and enough added lift to raise her into the air in an almost verti-

(Continued on page 72)

Join the MEGOW Parade

Sensational WAR MODELS!

BELL PURSUIT Famous plane of terrific speed and fighting ability.

☆

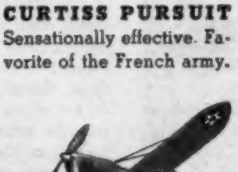
Now you build flying models like you read about in the war news every day. The biggest values ever offered for the price. Simple construction and sound design resulting in fine flying and greater duration. All details of originals faithfully carried out. 24-inch wingspan. Full color insignia sheets and Motor Hum Device included in each kit.

25c each

(By mail, post. 10c extra)

HAWKER HURRICANE Chief representative of the British in the air.

CURTISS PURSUIT Sensationally effective. Favorite of the French army.



RYAN STM Interesting two-seater training model of the U. S. A.

GLIDERS Galore

Z3. HAND-LAUNCHED GLIDER

A Class B Contest model of all-balsa construction. Wingspan 20 inches. Makes consistent flights for 40 seconds, and although brand new in the field, has already made several flights of over one hour. **25c**

(By mail, postage 10c extra)

Z3.

Z4.

Z4. TOW-LINE GLIDER

A Class D Contest model with monocoque fuselage. Wingspan, 54 inches. Aspect ratio, 15 to 1. Makes consistent flights of over one hour . . . **$1.00**

(By mail, postage 15c extra)

...A NEW STINSON 105 FLYING MODEL

50c *(By mail, postage 10c extra)*

A new addition to the famous Megow line of 30-inch rubber-powered flying models. Real "class" in every line and a beautiful flier.

...AND A BIG NEW RYAN STM TRAINER

50c *(By mail, postage 10c extra)*

An opportunity for you to build, easily and quickly, a most interesting 30-inch model of this outstanding plane.

Megow Color-Coded BALSA WOOD

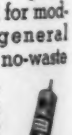
When you buy Balsa Wood from your Megow dealer, you can identify its hardness. You can select the right kind of wood to build each part. The ends of each sheet or strip are colored according to this code:

Extra Hard .	*Black*
Hard . . .	*Green*
Medium . .	*Red*
Soft	*Orange*
Dead Soft . .	*Yellow*

Color-coded Balsa Wood costs no more than ordinary, but it saves work and helps produce superior models.

Megow's KWIK-DRY CEMENT

According to exhaustive tension and bending tests in our Research Department, this cement far surpasses any we have ever tried. It contains new ingredients that give it quick, firm grip. It is transparent, waterproof, oilproof, flexible and quick-drying. Unsurpassed for model building and general household use. In no-waste tubes, 5c and 10c. Large sizes in cans and bottles. Ask at your dealer's, or order from catalog, if he cannot supply you.



Insist upon **Megow's**

DEPT. MA, HOWARD & OXFORD STS., PHILA., PA.
217 N. DESPLAINES ST., CHICAGO, ILL., or GREAT WEST. DIST. CO., 718 MISSION ST., SAN FRANCISCO, CAL.

WORLD'S LARGEST MANUFACTURERS OF MODEL

# of BIG PRIZE WINNERS

MEGOW'S Gas-Powered MODELS!

The most extensive line of big successes in the gas-powered field. Every model a product of the great Megow Engineering Laboratories—the very latest in model construction and design.

SOARING EAGLE. 3-unit construction, easy to build, transport and fly. Marvelous in performance. Climbs at steep angle, flies without hanging on propeller. Low-mounted wing—no tendency to loop.

Class A. Span 46". For any "A" motor. Finished propeller **$2.95**

Class B. Span 54". For any "B" motor. Finished propeller **$3.95**

Class C. Span 6 ft. For any 1/5 h.p. motor. Finished propeller and puncture-proof rubber wheels . . . **$4.95**

(By mail, postage 20c extra)

PIPER CUB. Beautiful model, easy to build. Megow's ready-carved Leading Edge. Span 52¾". For any ⅛" motor **$3.95**

CARDINAL. Ready-to-use propeller. Metal parts die-cast. Special rubber wheels. For any ⅛" motor. Span 48" **$3.95**

QUAKER FLASH. The world's champion. 3½" puncture-proof rubber wheels. For any ⅞" motor. Span 67" **$4.95**

COMMANDER. Hollow-carved Leading Edge. Detachable wing mounting. Realistic cabins. 6-ft. span. Takes any ⅞" motor. Megow Streamlined Rubber Wheels **$4.95**

CADET. Similar, but smaller. 51½" span. For any ⅛" motor. 2½" wheels **$3.95**

Any GAS-POWERED MODEL sent by mail, postage 20c extra

WIN A FREE Trip to the NATIONAL MODEL AIRPLANE MEET in Chicago!

BIG CASH PRIZES!

Thousands of Other Prizes!

THE Closing Date for the great MEGOW MODEL AIRPLANE CONTEST has been advanced to June 1st, so there is still time to enter, if you hurry! Ask your Megow dealer for full details, and see the many attractive prizes, gas-powered and other model kits that he is offering . . . and on top of that, remember that you may win one of the big, free, all-expenses-paid trips to the National Meet, or one of the many BIG CASH PRIZES being offered!

All types of models can be entered . . . so long as they are built from Megow kits. See your dealer today. Join the Contest and get your Official Contest Button. Start your model right away and go after a big prize!

SEND 5¢ POSTAGE TODAY

for big, profusely illustrated catalog of Model Airplanes, Ships and Railroads . . . equipment and supplies for hobbycrafters.

Megow Products, Pioneer Performers, Today, As Yesterday, Still Leaders Style, Value, Quality. Sky Symphony, Australia. Barrere Model Boutique, Hong Kong, China. Lopez Model Store, San Juan, P.R.I. Barreto, Manila, P. I. Granger Frères, Ltd., 64 Notre Dame, Ouest, Montreal, Canada.

PLANES, SHIPS AND HO-GAUGE RAILROADS

Academy of Model Aeronautics

(Continued from page 23)

D.C., and the present officers, Edward Roberts, Philadelphia, Pa., Irwin Polk, Irvington, N.J., and Carl Goldberg, Chicago, Ill.

Membership Applications

A.M.A. leaders are requested to point out to modelers the need for applying for membership in advance of the time credentials are required to compete in meets. It is difficult to handle last-minute requests for credentials. Usually such requests are mailed in the early part of the week and do not reach headquarters until Friday. The modeler usually writes "I want to compete in a meet this week-end." It is obviously impossible to clear the application and remittance fee through the Academy membership department, enroll the modeler as a member and send out the credentials to be received when desired.

Urge all prospective members to make application for membership early!

Academy leaders in the field are reminded that the new National Headquarters address is now:

Academy of Model Aeronautics
Willard Hotel
Washington, D.C.

Sanction Applications

The N.A.A. Contest Board requires that all applications for sanction be received at headquarters 30 days in advance of the meet. And the earlier the application comes to the Board, the more opportunity Headquarters staff has to publicize the competition.

Good News!

Academy Reduces Rubber Model Competition Membership to 50c Yearly; Minimum Age for Gas Model Competition Dropped to 14 Years

One of the first actions taken by officials of the new Academy of Model Aeronautics and approved by N.A.A. has been a reduction in the cost of Rubber Model Flyers licenses to an annual fee of 50c, it was announced recently. This means that from now on rubber model flyers need send only 50c to headquarters, together with a properly filled out application to receive their

(Continued on next page)

COMPLETE LISTING OF NATIONAL MODEL AIRCRAFT CATEGORIES AND RECORDS

Through April 1, 1940

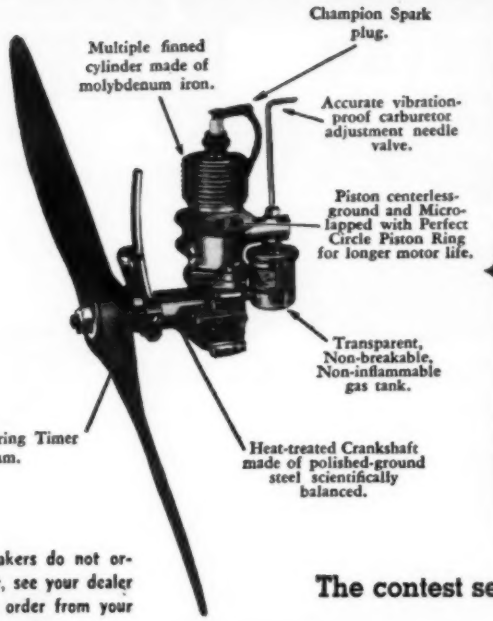
INDOORS

		Longest Duration
Stick Model, H.L., Class B		
Junior:	None established	
Senior: Ralph Brown	Boston, Mass.	11:45
Open: Sanford Oringer	Boston, Mass.	1:44
Stick Model, H.L., Class C		
Junior: Martin Phillips	Boston, Mass.	6:12.1
Senior Ralph Brown	Boston, Mass.	10:41
Open:	None established	
Stick Model, R.O.G., Class A		
Junior:	None established	
Senior: Harry Lerman	Boston, Mass.	8:14
Open:	None established	
Stick Model, R.O.G., Class B		
Junior:	None established	
Senior: Harry Lerman	Boston, Mass.	10:32
Open:	None established	
Stick Model, R.O.W., Class A		
Junior:	None established	
Senior	" "	
Open:	" "	
Stick Model, R.O.W., Class B		
Junior:	None established	
Senior: Harry Lerman	Boston, Mass.	6:43
Open:	None established	
Glider, H.L., Class A		
Junior: Martin Phillips	Boston, Mass.	:40
Senior: Ralph Brown	Boston, Mass.	:32.6
Open:	None established	
Glider, H.L., Class B		
Junior: Martin Phillips	Boston, Mass.	:31
Senior: Harry Lerman	Boston, Mass.	:31.2
Open:	None established	
Fuselage, R.O.G., Class B		
Junior:	None established	
Senior: Ralph Brown	Boston, Mass.	7:55
Open:	None established	
Fuselage, R.O.G., Class C		
Junior:	None established	
Senior: Stanley Stanwick	Boston, Mass.	8:10
Open:	None established	
Fuselage, R.O.W., Class B		
Junior:	None established	
Senior:	" "	
Open:	" "	
Autogiro		
Junior:	None established	
Senior:	" "	
Open:	" "	
Ornithopter		
Junior:	None established	
Senior:	" "	
Open:	" "	
Helicopter		
Junior: Ted Gonzoph	Philadelphia, Penna.	2:50.4
Senior: Harry Lerman	Boston, Mass.	2:42.2
Open:	None established	

OUTDOORS

		Average Duration
Stick, H.L., Class C		
Junior:	None established	
Senior:	" "	
Open:	" "	
Stick, H.L., Class D		
Junior:	None established	
Senior:	" "	
Open:	" "	
Stick, R.O.W., Class C		
Junior:	None established	
Senior:	" "	
Open:	" "	
Stick, R.O.W., Class D		
Junior:	None established	
Senior:	" "	
Open:	" "	
Glider, H.L., Class B		
Junior:	None established	
Senior: Norman McMorrow	Dist. of Col.	:14.4
Open: Lloyd Barclay	Hampton, Va.	:18.7
Glider, H.L., Class C		
Junior:	None established	
Senior:	" "	
Open:	" "	
Glider, H.L., Class D		
Junior:	None established	
Senior:	" "	
Open:	" "	
Glider, Tow-Line, Class C		
Junior:	None established	
Senior:	" "	
Open:	" "	
Glider, Tow-Line, Class D		
Junior:	None established	
Senior:	" "	
Open:	" "	
Glider, Tow-Line Class E		
Junior:	None established	
Senior:	" "	
Open:	" "	
Autogiro		
Junior:	None established	
Senior:	" "	
Open:	" "	
Helicopter		
Junior:	None established	
Senior:	" "	
Open:	" "	
Ornithopter		
Junior:	None established	
Senior:	" "	
Open:	" "	
Fuselage, R.O.G., Class C		
Junior:	None established	
Senior:	" "	
Open:	" "	
Fuselage, R.O.G., Class D		
Junior:	None established	
Senior:	" "	
Open:	" "	
Fuselage, R.O.G., Class E		
Junior:	None established	
Senior:	" "	
Open:	" "	
Fuselage, R.O.W., Class C		
Junior:	None established	
Senior:	" "	
Open:	" "	
Fuselage, R.O.W., Class D		
Junior:	None established	
Senior:	" "	
Open:	" "	
Fuselage, R.O.G., Class A, Gas		
Junior:	None established	
Senior: Gordon Murray	Brooklyn, N.Y.	1:50.3
Open:	None established	
Fuselage, R.O.G., Class B, Gas		
Junior:	None established	
Senior: Sal Taibi	Brooklyn, N.Y.	1:54
Open:	None established	
Fuselage, R.O.G., Class C, Gas		
Junior:	None established	
Senior:	" "	
Open:	" "	
Fuselage, R.O.W., Class A, Gas		
Junior:	None established	
Senior:	" "	
Open:	" "	
Fuselage, R.O.W., Class B, Gas		
Junior:	None established	
Senior:	" "	
Open:	" "	
Fuselage, R.O.W., Class C, Gas		
Junior:	None established	
Senior:	" "	
Open:	" "	

YOUR BEST BUY AND BEST BET
FOR CHAMPIONSHIP PERFORMANCE!


Champion Spark plug.
Multiple finned cylinder made of molybdenum iron.
Accurate vibration-proof carburetor adjustment needle valve.
Piston centerless-ground and Micro-lapped with Perfect Circle Piston Ring for longer motor life.
Transparent, Non-breakable, Non-inflammable gas tank.
Positive-firing Timer Cam.
Heat-treated Crankshaft made of polished-ground steel scientifically balanced.

Model Makers do not order direct, see your dealer —Dealers order from your Jobber.

Sky-Chief

ONLY $6.95 COMPLETE WITH COIL AND CONDENSER

Class "C" Motor—1/5 H.P.

FACTORY-TESTED — ABSOLUTELY GUARANTEED

SKY CHIEF "Lightning" 3 ounce Coil properly balanced with condenser to assure quick starting.

Bore 7/8", stroke 7/8", displacement .526.

R.P.M. up to 13,000 with 13" propeller.

Takes propeller 13" to 14" and equally adjustable to fly wheel.

All bearings are Diamond-bored and Micro-lapped.

Capable of 1/5 H.P. plus.

Weighs approximately 10 ounces with coil and condenser.

The contest season is on—Fly high to new records with your Sky Chief.

AMERICAN SUPERCRAFT CORPORATION, UNION AND LAKE STS., CHICAGO

membership card, Academy pin, gold-red-blue Academy emblem decal and registration certificates to be attached to rubber-powered craft.

(Those who have taken out N.A.A. Rubber Model Flyers licenses at $1 will be accorded the privilege of having their membership extended for an additional 12 months from the expiration date at no charge. It is anticipated by Academy leaders that this reduction in Rubber Model Flyers membership fee will work to the benefit of a great number of rubber model flyers, and to the benefit of rubber model activity as a whole throughout the country.)

Gas Licenses Available to Those 14 and 15

Another important change made by the new Academy is the lowering of the minimum age for gas model license members to 14 years. It was pointed out that with the Government training pilots at the age of 18, gas model builders are certainly capable, and have demonstrated that they can carry on their activities with little supervision after reaching the age of 14.

National Aviation Forum

The National Aviation Forum will be held in Washington on May 27, 28, 29 and 30. Delegates from all over the country will be present and everyone interested in aviation is invited, for aviation problems which confront the nation and individuals in their various communities will be discussed at length.

The object of the conference is to seek solutions for current difficulties arising and to plan for the healthy expansion of aviation in the future. All those who possibly can attend this forum should be on hand—your help is needed, especially in combating such actions as Congress took recently in cutting the U.S. Air Force budget, which now enables a mere handful of aircraft to be purchased for the army, in contrast to the reserve that was requested.

At such a time as this, with warring nations infringing the rights of others, it appears that Congress must have thrown wisdom to the winds and responded to some other influence. If cuts in budgets must be made at least do not curtail the means of creating our strongest arm of our national defense, for unless we build up a strong defense in aviation we may have nothing to defend.

Readers of these columns may recall a notice which appeared in MODEL AIRPLANE NEWS several months ago. Concerning it the following letter was received at Academy headquarters:

"You may recall our correspondence in relation to our Ohlsson motor which was stolen from us at Union City last fall.

"I saw the notice in M.A.N. I have no way of proving the following statement, but I feel that the above mentioned notice may have been the deciding factor. Our motor has been returned to the club, which turned it over to us. The person who returned it was very sorry for his act, having never done such a thing before."

Moral: For outstanding results—tell your story in M.A.N.!

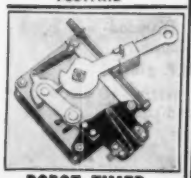
BLUE CROWN 50c
Especially designed for
HIGH SPEED ENGINES
Makes starting easier
PLEASE ORDER FROM YOUR DEALER
A-1-3/8-24
A-2-1/4-32
J. E. MENAUGH COMPANY - CHICAGO

Triple Strength
SILKSPAN TISSUE
GM
Lightest, strongest! Insoluble in water!
American Made
Costs no more!
24X36 SHEETS 3 25¢

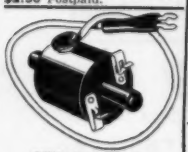
Outstanding achievement! Made by patented process. Exhaustive tests demonstrate SILKSPAN 300%-400% stronger than most costly, imported kind. Brilliant colors: Red, Yellow, Army Blue, Orange, White (others coming!)
PERFECT on CORNERS & CURVES
SILKSPAN, when dampened, acts like silk. Takes dope uniformly; Shrinks evenly without straining model. No rough surface fibers (minimizes sanding) SPECIAL INTRODUCTORY OFFER: 3 24"x36" sheets, 25c; ALSO SILKSPAN '00'—for rubber jobs—10 20" x24" sheets, 25c.
DEALERS—JOBBERS: Write for attractive proposition on this superior AMERICAN covering.
POLKS MODEL HOBBY PRODUCTS
(Dept. M) 429 7th Ave., New York, N. Y.

See the Prize-winning SCIENTIFIC

MODELCRAFT
GAS MODEL PROPELLERS
9" 25c
10" 25c
11" 25c
12" 25c
13" 25c
14" 25c
25c Ea.
POSTPAID



ROBOT TIMER
Small size, only 1¼ oz. Setting of a knob gives the desired time 100% accurate and guaranteed. See the new Scientific Robot Timer at your dealer or order direct, $2.50 Postpaid.



AERO COILS
2 ounce 1½ volt coil ..... $2.50 p.p.
2¼ ounce 3 volt coil ..... $2.25 p.p
Postpaid

EXHAUST MANIFOLD
50¢

"KNEE ACTION" TAIL WHEEL UNIT
75c p.p.

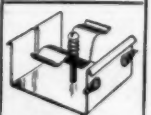
Prop. Spinner 25c p.p.

AUSTIN TIMER
$1.25
Postpaid

SCIENTIFIC STAR PROPS
9" 25c
10" 25c
11" 25c
12" 25c
13" 25c
14" 25c
25c EACH
Postpaid

SMITH World's Finest Ignition Coil
$2.50 P.P.

PLUG WRENCHES
Any Size 25c P.P.



New Design Battery Case
Penlite size ¼ oz. ..... 40c p.p
Intermediate size, ⅜ oz. ..... 40c p.p
Regular size ½ oz. ..... 50c p.p

RACE CAR WHEELS
GARDNER WHEELS
6.00 x 17—$1.10 ea. P.P.
6.75 x 17— 1.25 ea. P.P.
SOLID RUBBER WHEELS
3½" dia. x ⅞"—$1.25 ea. P.P.

RACE CARS SPEED KING
KIT
$15.00
POSTPAID

DOOLING BROS. RACE CAR
Wheel Base 13". Overall Length 18". Complete Wt. 7 lbs. FRONT WHEEL DRIVE. Complete Kit $19.50 P.P. (less motor). New "Deluxe" rear drive, complete kit $23.50 P.P. (less motor).

STARLING CLASS "A"

"Starling" Class "A" Gas Model
WINGSPAN—40" WING AREA—210 sq. in.
LENGTH OVER-ALL—27¼"

Here's the newest member of the SCIENTIFIC model family which advance notices herald to be the next champion. While the "STARLING" was designed for perfect performance with the Atom motor, it is an all around model for other Class "A" motors, too. The lines and beauty of the Starling are only exceeded by its ability to perform. The wing ribs, tail parts, fuselage sides and bulkheads are all die cut, assuring you exactness. FEATURES: the fuselage is all balsa and is constructed on an entirely new principle, making it many times stronger. The entire motor hookup and landing gear are attached as one unit with an adjustable battery case for balance adjustment. Other features are the ready-made clamp for attaching the landing gear, the finished propeller, and new clear detailed full-size plans, besides the streamlined balsa wheels, and oh, so many other items are included in the kit which is 100% complete. Price, less the motor..... **$1.95 PP**

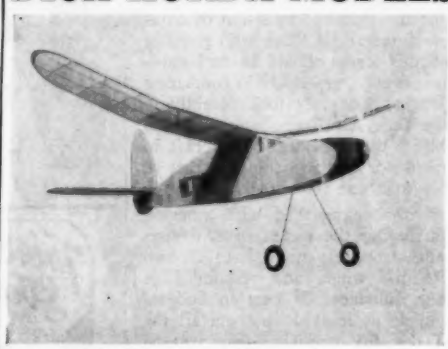
GAS MODEL CL

ENSIGN

THE NEW ENSIGN
1940'S RECORD-SMASHING

Developed over a period of eight months, and [illegible] authorities on gas models and gas engines in Amer[illegible] for Class B models. Designed for prize winning [illegible] flat glides are easily achieved with the [illegible] adjusted for vertical banks and tight turns with [illegible]
The Ensign represents a thoroughly efficient [illegible] area together with its highly efficient airfoil sec[illegible] this model's amazing performance.
Structurally sound, the Ensign has been design[illegible] collision with obstruction[illegible] Easily constructed [illegible] cross at forward[illegible] well known [illegible]

DICK KORDA MODELS



VICTORY WINGSPAN 32" LENGTH 23" **50c P.P.**

GOLD STAR WINGSPAN 30" LENGTH 22½" **50c P.P.**

GAS TYPE MODELS

"The Flea" Wingspan 36"—length 28"—weighs 3 oz. Kit contains everything: including M & M wheels, dummy gas engine..... **$1.95 P.P.**

"Miss America" 40" WING-SPAN—LENGTH 27½"—FLIES 1 MILE. An easy model for the beginner. Kit 100% complete including M & M wheels.... **$1.95 P.P.**

"Firefly"
WINGSPAN 36"—LENGTH 28"—FLIES 1 MILE. Looks, sounds and flies like a real gas job. Kit 100% complete including M & M pneumatic wheels.. **$1.95 P.P.**

SCIENTIFIC'S [illegible] Awa[illegible]
To the winners o[illegible] 1940 N[illegible] tional Champions[illegible] providi[illegible] the winner is fl[illegible] scienti[illegible] ship bearing the [illegible] which is [illegible] cluded free in eve[illegible].
AWARDS...
Class A $ [illegible]rling
Class B $ [illegible]sign
Class C $1[illegible] ercury

SCIENTIFIC GLI[illegible]
Bonsts of record flight of [illegible] hour. Wingspan 20¾", len[illegible] mile. SCIENTIFICALLY streamli[illegible] Glassy e[illegible] combine beauty with perfo[illegible] features a[illegible] Build it in a jiffy and get th[illegible] thrill of a lifetime. Complet[illegible] with full size plans and [illegible] structions.

SEE YOUR DEAL[illegible] OR C[illegible]
SCIENTIFIC MO[illegible] AI[illegible]
"GAS MODE[illegible] ADQU[illegible]
218-220 MA-6 MA[illegible] ST.,

*Items marked p.p. are postpaid.

TIC Air Parade at your Dealer

MPIONS "B"

SCIENTIFIC

GAS MODEL

Ben Shereshaw, one of the foremost ...Ensign definitely sets a new standard ...breath-taking climbs and long ...So spirally stable it may be ...danger of spinning in. ...small amount of frontal ...Scientific, are the reasons for ...

...and will withstand any accidental ...

...the Ensign will assure your suc... Scientific has gone further for they ...complete kit, with selected Grade ...new Ensign justice. Just check the ...and you will ...it's a BUY at **$2.95 P.P.**

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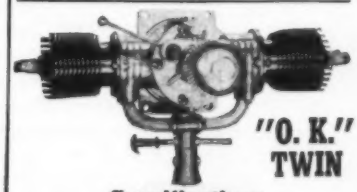

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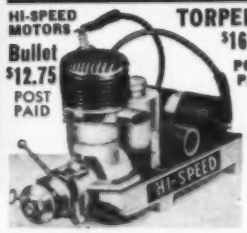

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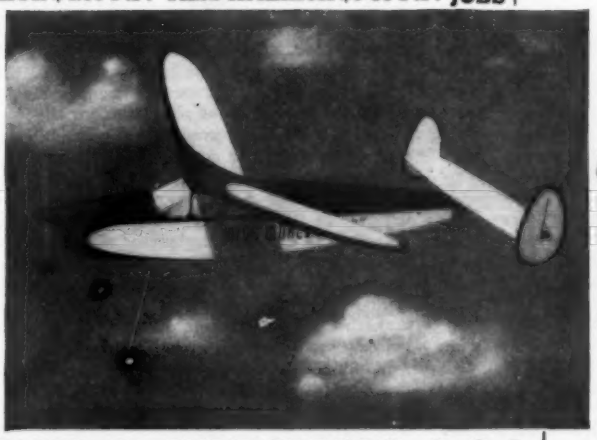

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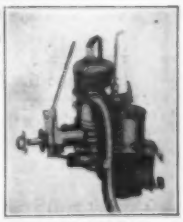

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MODEL AIRPLANE NEWS CENSUS
551 FIFTH AVENUE ... N.Y.C.

Scout of the Cruiser

(Continued from page 13)

Ranger inverted "V" air-cooled engine, became Bureau of Aeronautics Design No. 403 from which came the Curtiss XSO3C-1. This practice, followed also by the army with its Air Corps Design numbers, is often frowned upon by the manufacturers inasmuch as it leads to almost identical construction, performance and exterior appearance, as witness the similarity of our cover plane this month with the Vought XSO2U-1. However, such procedure assures the navy and army of the maximum in both economy of production, and conformance with naval design specifications for this type airplane.

The Curtiss XSO3C-1 two-seater midwing monoplane is powered with a single Ranger SGV-770-B 12-cylinder inverted Vee air-cooled supercharged and geared engine developing 420 horsepower at 2850 r.p.m. at 5,700 feet altitude. This is the first time the Ranger engine has been used by the navy and the first time in recent years that a Vee engine has been installed in a navy ship, although the navy still enforces its rule of no liquid-cooled motors. This engine develops 300 horsepower at 2500 r.p.m. at 10,500 feet cruising rating and has 500 horsepower available for takeoff at a duration of five minutes only. It is supercharged 8.84:1 and geared 3:2 and the main factor in its selection for use in this type airplane was its rated fuel consumption of only .65 lb./b.h.p./hr.

This engine drives a Curtiss two-position electrically controllable pitch two-bladed propeller encased in a streamlined metal nose spinner. The engine is enclosed in a tight fitting Dzus fastened metal cowling. Below the spinner is the air intake for the motor. This air is forced into the engine compartment under a considerable ram and is routed along the cylinders through tightly baffled walls and out a vented duct on the left side of the fuselage. Only other protuberance is the large carburetor air scoop on the left side of the fuselage ahead of the cooling air outlet. Although in this type engine the oil is usually carried within the crankcase and no separate oil reservoir required, due to the long range design of this ship, an additional oil tank with a service capacity of 4.5 gallons is mounted in the upper portion of the powerplant section just forward of the fire-wall.

The fire-wall is composed of a single flanged sheet of corrosion-resistant steel to which are mounted the individual line disconnect blocks, main electrical power panel, battery and holder and fuel pump and accessories. The engine mount consisting of two chrome-molybdenum steel tubing trusses bolted to the upper fuselage fire-wall attachment fittings is detachable either as a unit or as a complete powerplant for ease of maintenance.

The fuselage is constructed of three water-tight bulkheads and four conventional flanged bulkheads. Cutouts allow passage of the fuselage stringers which are attached by riveted clips. This framework is covered with 24ST aluminum alloy sheet "Alclad" riveted in strip sections.

The pilot is located high and well forward in the hull, being situated just forward of the leading edge of the wing and completely enclosed in a water-tight sliding hatch. His seat is mounted on two chrome-plated tubes vertically mounted and is adjustable through a distance of ten inches through conventional shock cord and pin release mechanism. The rudder pedals are interconnected with the main float steering rudder when installed and with the wheel brakes when the ship is equipped as a landplane.

Main instrument panel consists of suction gauge, magnetic compass, manifold pressure gauge, fuel pressure warning signal, clock, artificial horizon, radio compass, bank and turn indicator, altimeter, engine gauge unit consisting of oil pressure, fuel pressure, oil temperature gauges, airspeed indicator, carburetor mixture thermometer, fuel-air ratio indicator, turn indicator, free air thermometer and cylinder head temperature indicator. Just below the main instrument panel on the left is the electrical control panel which includes toggle switches and rheostate controls for the cockpit lights, fuel gauge lights, navigational instrument lights, landing lights, battery main line switch, generator cut-out switch, pitot tube heating switch, machine-gun sight lighting switch, oil dilution control switch, bomb arming switch and release switch, salvo switch and gun solonoid switch. The engine control quadrant is mounted on the upper left-hand side of the cockpit and contains the throttle, mixture control and propeller pitch control knobs. In addition, mounted within the knob of the throttle is the radio relay thumb release in which the radio, whether turned to transmitter, receiver or interphone, may be operated for listening and then speaking. This arrangement is used insofar as the pilot's hand remains on the throttle for the greatest portion of the time in flight.

On a flight control panel to the left of the pilot's seat is mounted the slot and flap control handles, the hand fuel wobble pump and the trim tab control drums. The flare release handles (two) are mounted to the right of the seat as is the life raft inflating knob which releases the carbon dioxide gas contained in the cylinder attached to the raft in the stowed position. In addition, the Very signal pistol with container holding six cartridges is mounted on the right side of the pit near the floor.

Various other installations are mounted where convenient such as the flap position indicator, the engine primer pump, the venturi-vacuum pump selector valve, the ignition switch, carburetor heat control handle, rate-of-climb indicator, radio receiver and radio transmitter together with tuning unit and coil sets mounted on Lord anti-vibration rubber mountings at the right-hand side of the front cockpit.

Behind the pilot's headrest is additional view rearward provided by a single narrow glass panel which also serves as access to the main fuselage fuel tanks of which there are two, each holding 38 gallons. Emergency dump valves are provided in the bottom of the fuselage. All emergency equipment of a general nature, as distinguished from personal equipment such as parachute and life raft, is installed in the mid-fuselage between the two cockpits. Here may be found the quick-inflating life raft, the emergency rations including a fesh water cylinder holding ten gallons, all secured to the raft, emergency fuselage flotation valve

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.171 H.P. at 8000 R.P.M.; Displacement, .275 cu. in.; static thrust, 30-32 oz. av.; Dowmetal diamond-bored case; one-piece counter-balanced shaft with rotary valve integral; hardened steel timing cam; oversize bronze bearings; runs upright or inverted.

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gear and remotely controlled bilge pump equipment.

The rear cockpit is situated in the extreme rear portion of the hull almost under the vertical stabilizer. It is large, roomy and compact and contains only the bare essentials of the fighting cockpit together with the completeness of the navigator's cockpit. The entire front of the cockpit (the observer-gunner has no vision forward) is composed of a collapsible drawing board which unfastens and lowers to the observer's lap. On this board is usually found a permanently installed map of the region in which the ship is stationed, together with various detailed maps of surrounding locales. Complete navigational instruments including a sextant, dividers, straight-edge, compass, parallels and a longitude-latitude chart together with the nautical almanac for use in sextant readings are stowed in the cupboard behind the board.

Auxiliary instruments to be found in sub panels on either side of the map board in the rear cockpit are chronometer, airspeed indicator, altimeter, drift meter, compass, manifold pressure gauge, tachometer and engine thermometer. Complete flight controls are mounted within the pit and the seat may be raised a distance of 26 inches with the cockpit enclosure open to aid landing the ship in emergency. An engine control quadrant identical to that used in the front cockpit is mounted on the left side of the rear cockpit.

Actual radio transmitting and receiving control boxes are located in the rear cockpit, although for roominess the sets themselves are installed in the front cockpit with auxiliary controls available to the pilot. Fire control equipment is mounted in the floor of the rear cockpit as is the drift meter installation.

When functioning as a rear gunner, the observer may slide his hatch forward, lower the rear fuselage cowling which is made up of three folding sections down into the fuselage and have ample room to fire the rear gun which is of the Colt-Browning Type M-2 thirty caliber flexible variety.

Other armament aboard the XSO3C-1 is composed of two other machine guns mounted in the wings just outboard of the propeller arc and electrically controlled from triggers on the pilot's stick. Bomb racks may be installed on the lower surface of the wings and a small torpedo may be carried beneath the belly when equipped as a landplane. All of this equipment, however, is classified as overload and is only considered as emergency installations.

The wing is built up on two spars, the front spar being of sheet web and milled solid chrome-molybdenum cap strips while the rear spar is a single sheet of chrome-moly steel sheet flanged at top and bottom. The ribs are of the pressed flanged type and are divided into three sections; a nose section, a center section and a tail section. From station 54 inboards the center rib sections have been omitted to make room for the main wing fuel tanks which have a capacity of 27 gallons each, making a total capacity of the ship of 140 gallons. Half-inch tubing carries the fuel from the

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four tanks to a main fuel cock located at the bottom of the fire-wall from which it is directed by a fuel selector valve to the carburetor.

The wings attach to fuselage fittings at the spars only and are fully faired in. The wing sits about mid-fuselage giving it the maximum in aerodynamic efficiency. The ailerons and flaps are of metal frame-fabric covering, the flaps being of the trailing edge type.

The slots are of the automatic type after release from the cockpit but are under ordinary maneuvering controlled from the cockpit. The landing lights are located in the under side of each wing panel and are fully retractable, folding flush with the lower surface of each wing panel.

The tail surfaces are of conventional all-metal construction fabric-covered and are dynamically and statically balanced through the use of balanced design and lead weights bolted into the leading (overhanging) edge of each movable surface.

The landing gear (wheels) is of the full cantilever internal sprung pneudralic oleo design with full streamline and pants covering the wheels. The tail wheel is of long-travel oleo design and is full swiveling but may be locked in the take-off and landing position.

For float installation, a full cantilever pylon design is used for the first time on a service-type ship. Full cantilever wing pontoons are bolted into the wing panels outboards near the tips. The tail wheel is removed and its fittings covered by a sheet of Dzus-fastened aluminum. The entire operation may be accomplished in a few hours although it is the plans of the navy to maintain only the original prototype with a wheeled landing gear. The remainder of the contract for 80 ships will be assembled with a seaplane gear for use aboard the Cruiser Division of the Aircraft Battle Force.

Preliminary performance figures for the XSO3C-1 indicate that its multitudinous duties and great variety of installed equipment have definitely eliminated it from the hi-speed class but for its classification, weight and power; its top speed of 190 miles per hour at 11,500 feet is certainly meeting a design problem successfully. It cruises at 146 miles per hour at 5,500 feet and has a landing speed (on land) of 57 miles per hour. As is the custom, no water landing speed is given as a seaplane may be safely landed by an experienced pilot at practically any speed.

The Curtiss XSO3C-1 has a wing span of 39 feet, 8½ inches and is 33 feet 11¼ inches long. It has a gross weight (seaplane) of 6488 pounds fully loaded with 2180 pounds of useful load. The landplane version weighs slightly less; 6390 pounds.

The life of the XSO3C-1 will be a mad kaleidoscope of back-breaking leaps into the air from the jerk of the catapult, the acrid stench of black powder floating above the battle seas, the tiny metallic hum of the wireless, the bone-crushing impact of smacking twelve-foot waves beside the foam-flecked decks of its cruiser and the catch-as-catch-can battle of red-green streaked machine gun fire with enemy seaplanes. But the XSO3C-1 will, through it all, remain the eyes of the cruiser, seeing, reporting—conquering.

The Physics of the Airplane

(Continued from page 16)

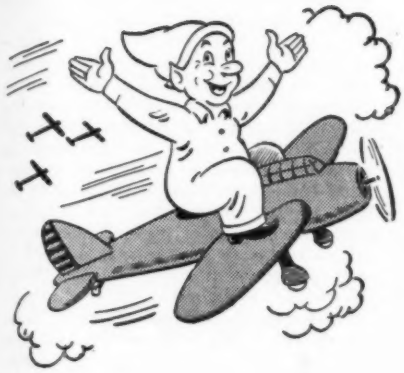
ward, along the valve stem for example, as a wave of temperature. A daily heating and cooling of the earth's surface occurs, due to its being turned successively toward and away from the sun. Waves of temperature are thus produced which greatly influence meteorological and weather conditions upon which all flight operations are so dependent. Should a conductor be attached to an airplane's battery, and the potential of the battery varied systematically through a rheostat device, an electric wave is transmitted along the conductor.

The two general classifications of wave motions in matter resolve themselves into "transverse" waves and "longitudinal" waves. In the former case, the particles of the medium travel in paths which are at right angles or normal to the direction in which the wave is traveling. Thus, if the waves are traveling in the horizontal direction, the particles which constitute the wave are displaced in the vertical direction. This applies, for instance, to the waves in a stretched string. When the particles in the medium through which the waves are traveling are displaced backward, and forward in the direction in which the waves are moving, the resultant waves are designated as longitudinal waves. Such is the case, for instance, with sound waves.

Vibration is a form of wave motion, the effects of which exert a vital influence on the design of airplane structures, aircraft power plants and even upon that of accessory devices such as aircraft instruments. Any vibrating body passes back and forth through its position of equilibrium. The extreme displacement on either side of the position of equilibrium is designated "amplitude" of the vibration. This displacement is equivalent in magnitude on both sides of the position of equilibrium. Another important term is the "frequency of vibration" which represents the number of complete vibrations made by the involved body in one second. It is recognized as a fact among airplane designers that the light airplane incorporates much higher vibration frequencies than does the larger type of airplane. This makes for a decided advantage in the case of the lighter structure since resonant periods, those during which the amplitude of the vibrations reaches a magnitude exceeding the limit of safety, are less likely to occur in this type of airplane. Thus the attendant fatigue stresses and possible crystallization of parts which not infrequently terminate in the ultimate failure and collapse of the structure, are practically eliminated.

The distance between successive crests or between successive troughs in a water wave is called a "wave length" as is illustrated in Fig. 1. The same terminology is applicable of any wave motion. To give an example or what we may say an ample definition, we might say that the wave length is the distance "traveled by the involved wave during one vibration period." A definite relation exists between the factors of wave length, frequency and velocity. To indicate this relation in formula form:

$$W = \frac{V}{N}$$



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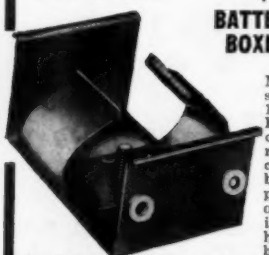

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where W represents the length of each wave; n, represents the number of vibrations made by the particle of the medium involved in one second; and v, represents the distance traveled by the wave in one second. To adequately express this statement in words, we would say that:

$$\text{Wave Length} = \frac{\text{Velocity}}{\text{frequency}}$$

This relation can also be expressed conversely as follows:

$$v = n \times W,$$

where the symbols employed possess the same significance as before.

One of the greatest aids invented for the furtherance of scheduled aircraft operations, both commercial and military, in recent years is undoubtedly the factor of radio communication for aircraft. The entire engineering structure underlying the science of radio communication is fundamentally based upon wave motion in a medium which science calls for want of a better name, "the ether," which permeates all space. The normal velocity of radio waves is very high, approximately 186,000 miles per second or 300,000 kilometers per second. Radio and light waves are electromagnetic in composition and react to the same influences. As mentioned previously, radio wave length is equal to the velocity of the waves divided by the frequency. It is expressed as follows:

$$\underset{\text{(meters)}}{\text{Wave Length}} = \frac{\text{velocity } \left(\begin{smallmatrix}\text{in meters}\\ \text{per}\\ \text{second}\end{smallmatrix}\right)}{\text{frequency}_{\left(\begin{smallmatrix}\text{cycles}\\ \text{per second}\end{smallmatrix}\right)}}$$

Radio frequencies range from 16,000 to 300,000,000 cycles per second normally. The audio frequencies, those within normal audible range from 16 to 16,000 cycles per second.

The field of magnetic force of a radio wave is located at right angles or normal to the original electric force and acts horizontally. Radio waves are, therefore, classified under the general heading of transverse waves according to the definition given elsewhere in this article.

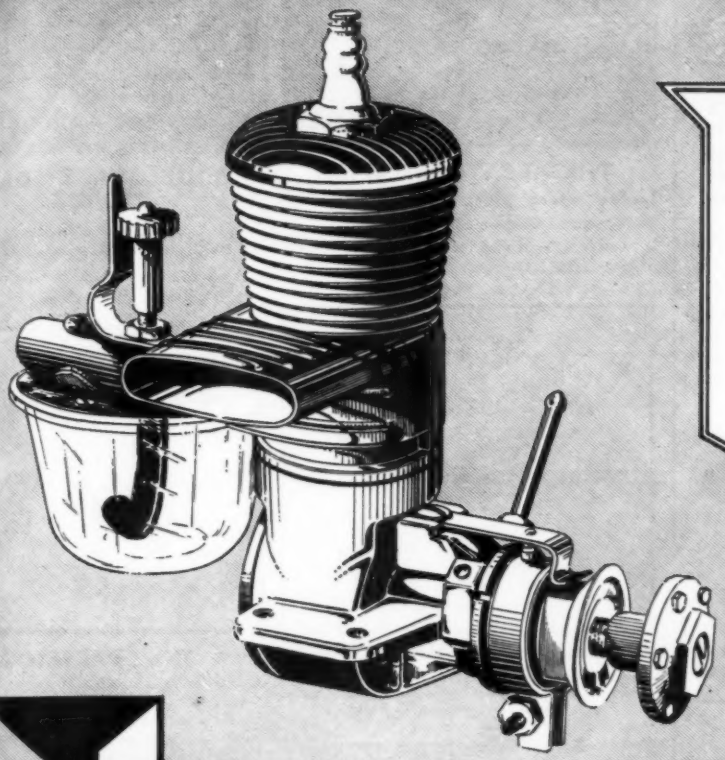
The characteristic of a train of waves set up or developed by a center of disturbance indicates that it moves to and fro with a simple harmonic motion, the nature of which was discussed previously in this series of articles. As a consequence each particle of the medium is set up in a harmonic motion. However, the phase of vibration varies from point to point at each instant. Such a train of waves is represented graphically by the illustration in Fig. 2. The points designated by the symbol N are termed "nodes" and indicate the relative position of the waves along the horizontal axis. No displacement of the particles of the medium occurs at these nodes. This condition is true because the two waves shown are always in opposite phase and consequently neutralize each other. Midway between the two waves shown are always opposite in phase, and consequently, neutralize each other. Midway between the nodes are points called "antinodes" which indicate the maximum amplitude of vibration. Here the two waves are always the same phase and the resultant displacement goes through its greatest variation.

If a rod is inserted in a rigid base and its free end is pulled aside and then released, a wave travels to the fixed end. At this point, it is reflected and travels back again to the free end or point of origin. In this manner there is set up in the rod a system of stationary waves. This principle has been employed in the visual beacon course indicator as used on commercial airliners. The radio beacon installed on the ground for use with this device is known as a double modulation beacon and incorporates two loop antennae located at right angles to each other. Each of these antennae emits a set or train of radio waves which is directive; that is, is stronger in one specific direction than in others. When an airplane flies along a line exactly equidistant from the two beams of radio waves, it receives signals of equal intensity from the two. When the airplane strays from this line, it receives a stronger signal from one than the other.

Within the airplane itself, the visual indicating instrument consists of two vibrating steel reeds. These reeds are tuned mechanically to the two beacon frequencies modulated at 95 and 85 cycles (approximate in value). The instrument is mounted on the instrument board of the airliner and is connected to the output circuit of the receiving equipment. When the beacon signals are recepted the two reeds vibrate. The tips of the reeds are white against a background of dark color, so that when vibrating, they appear as vertical white lines. Being tuned to the beacon frequencies, they serve as a device for indicating equality of the received signals from the two antennae of the radio beacon station.

Thus when the airplane is on its correct flight course the two lines are equal in length. A deviation, no matter how slight, from the course to the left serves to increase the relative reflection of the left reed. The reverse becomes true should the airplane veer to the right of its proper course. To return to the course, the pilot turns the airplane in the direction of the shorter reed reflection.

We are also concerned with problems of vibration and the analysis of such in the design of crankshaft or extended propeller shafts. Through sensitive recording devices, charts are prepared which show the critical frequencies of vibration on shafts of this nature and from these charts, the nodes and antinodes can be charted. A propeller shaft may be considered a cantilever rod and under the impulse of uneven firing of a radical engine, it will have points which appear in an analysis as its critical point or antinode. When this condition is very critical, the shaft at that point is reinforced by being made heavier or else some kind of bearing is placed at this point to sustain the load. All shafts tend to bend. This bending may be very small, but when one considers the weight of a propeller and its whirling action, a slight deviation is dangerous. Propeller blades also tend to act similar to a reed which is pulled from one side and left to move back and forth in harmonic motion. This motion is vibration, and since the blade element is a true cantilever of great length reinforced mainly at the propeller hub, the major portion of the "whine" of the propeller can be attributed to the vibration of the blade elements during power dives.



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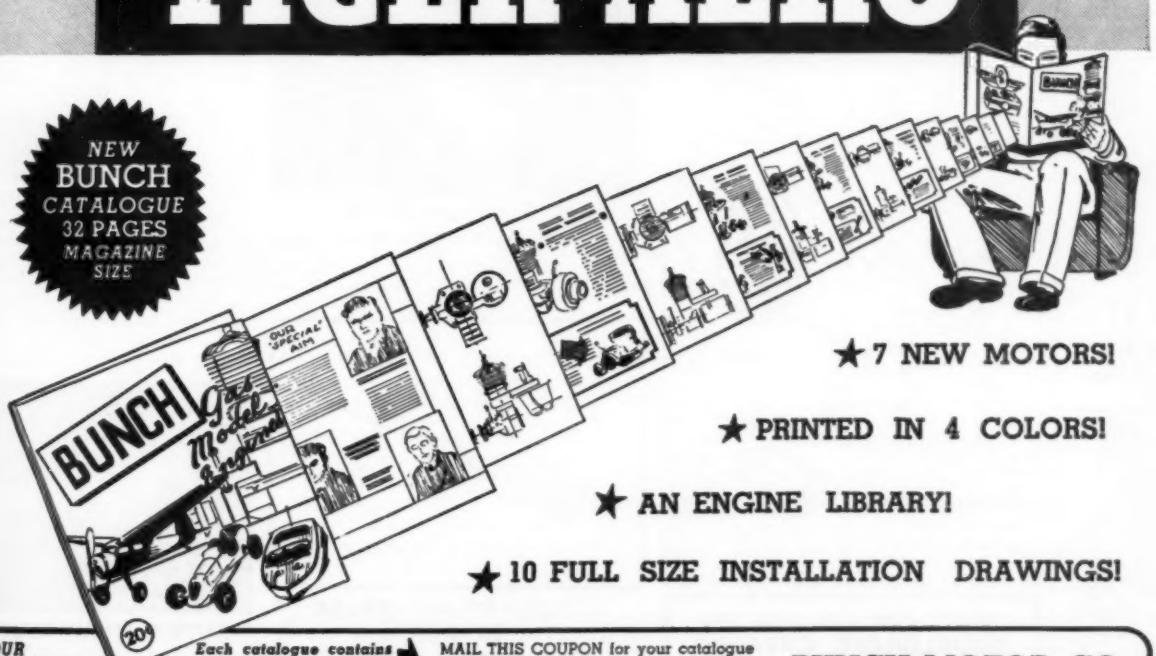

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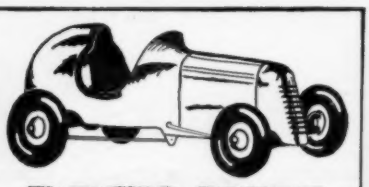

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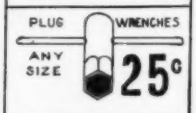

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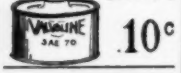

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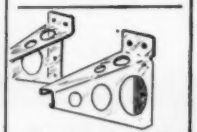

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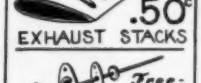

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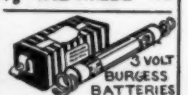

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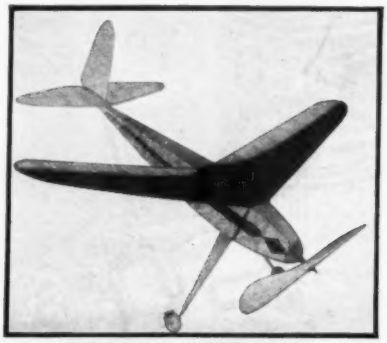

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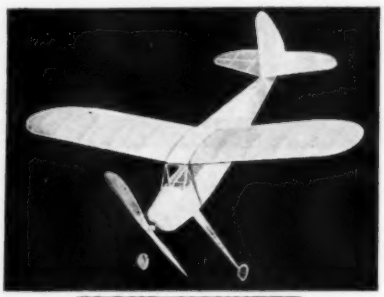

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40 in. model, same ship as Pacific Ace, add 10c postage 50c

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Wing Area 191 sq. in.

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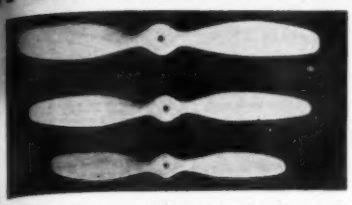
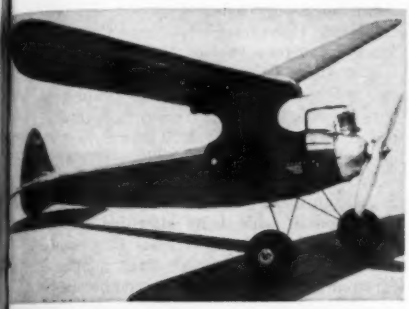


made from straight grain hard wood. D-G have shown from 20 to 30% more thrust in every than any other prop. The most convincing test to put one on your ship and see it climb faster it ever climbed before. Sold by all dealers and distributors who want to give you the best. Get up now. Complete range of sizes, 10" 11" 12" 13" 13½" 14" **25c**



INTERCEPTOR—CLASS "B"

World's fastest climbing model. Engine for engine, this ship will grab nearly twice as much altitude with the same engine run. Power with, Ohlsson 23, Ohlsson Brown Brownie, Bantam, HiSpeed Bullet or Torpedo, or similar engines. Wing span 46" chord 7". Kit complete with cement, dope, covering, all printed parts, bent landing gears, turned aluminum cowl, and Model Airwheels. Price..... **$2.95** POSTPAID

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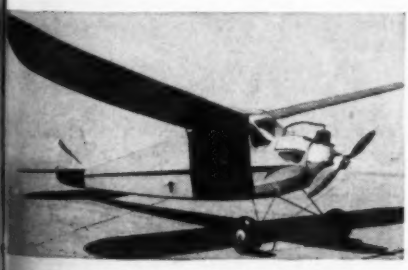

SKY BABY—CLASS "B"

Designed for Class "B" engine such as Ohlsson 23, Torpedo, Junior Motors Brownie, this model in its test flights did 15 minutes on a 12 second engine run. Has won many firsts, including the recent Fresno contest. Wing span 54", chord 7". Kit complete with cement, dope, covering, formed landing gear, air wheels, spun aluminum cowl, etc..... **$3.85**

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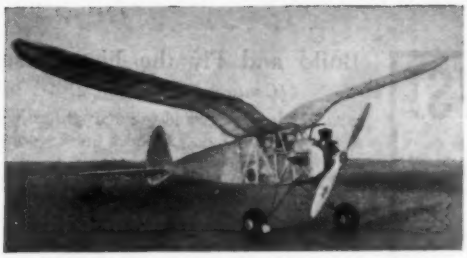

SPOOK—CLASS "A" or "B"

SPOOK 48" Specifications: Wing span 4 ft.; flying weight with Ohlsson "19", 18 oz. Wing loading 8 oz. per sq. ft. Can be flown as class "B" with Ohlsson "23", Hi-Speed or Brownie. Kit complete with cement, dope, covering and wheels..... **$1.50**

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The most popular small ship with an unequalled string of "firsts". May be flown class "A" with Ohlsson "19", Madewell or Bantom. Class "B" with Ohlsson "23" or Hi-Speed.

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STANDARD KIT same, but with bamboo paper covering.....**$2.95**
DRY KIT complete except for wheels, covering, cement and dope **$1.95**
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PACIFIC ACE—CLASS "C"

66 in. tapered wing. DE LUXE KIT contains tapered spars, beveled and tapered trailing edge, die-cut ribs, turned aluminum cowl, 1 qt. gas dope, 1 pt. cement, 3½ yds. super silk, formed landing gear, 4½ in. inflatable air wheels, dural wire, alum. tube, washers, bolts, haskalite, dural sheet, hook up wire, switch, selected hard balsa, full sized, black and white, plans with test flight instructions, complete..... **$8.50**

STANDARD KIT with bamboo paper, ½ pt. of dope, 1 pt. of cement and 3½ in. air wheels..... **$6.25**
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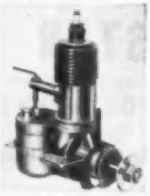
BROWN Class "C"



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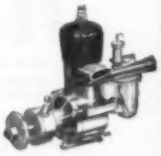

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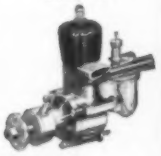

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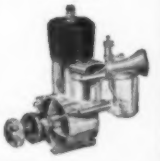
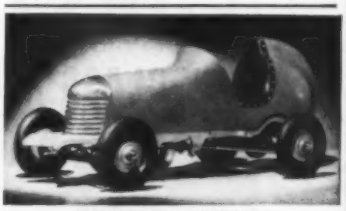


.60 Displacement For your Pacific Ace $21.50



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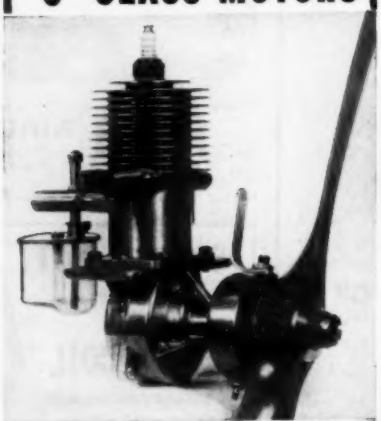
"C" CLASS MOTORS



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Past records prove it, ask the owners!

WRITE FOR OUR CIRCULAR "C"

FORSTER BROTHERS
519 Lake Street Maywood, Illinois

Build and Fly the Fiat Pursuit

(Continued from page 27)

edge section is covered top and bottom with 1/32" sheet. Edges of sheet are supported by 1/16" square balsa strips. Note that a 3/8" thick balsa triangle is cemented within each root to take the landing gear strut. Reenforce edges of ribs—designated on the plan as a and b—with 1/16" square to prevent paper pull. Cement each stub in place on the fuselage. Shape wing fillet block to fit between bulkheads 1 and 2, matching the fuselage contours and rib B, the inner stub rib. See detail on plan. Cut trailing edge fillets from 1/16" sheet balsa and attach as shown on the top view. Shape the tail block to match bulkhead No. 10, sand and cement in place.

To cover, apply narrow strips of tissue, grain running longitudinally. Use thickened dope to attach edges of paper, avoiding use of wide pieces of tissue because of likelihood of wrinkling. Spray with water; dope when dry and taut.

Landing Gear

Landing gear struts are 1/4" diameter hardwood dowels. Wheels are either 1-3/4" or 1-7/8" celluloid mounted on .028 wire axles. The ends of the axles are bent at right angles and imbedded in the dowels. See detail. Bind the axles to the dowels and cement. Work the struts into the drilled reenforcement blocks in wind stubs and cement thoroughly. The 1/32" sheet balsa is bent cross-grain to imitate fork of real ship's landing gear.

Tail wheel is either 5/8" or 3/4" diameter. Axle is bent from .028 and attached as shown on the plan.

Tail Assembly

The spars of both stabilizer and rudder taper from 3/8" depth at base to 1/8" at tip. The assembly is done by pinning to the bench. The ribs are streamlined with sandpaper when assembly has dried. Edges are trimmed in the same operation to the requisite cross section. Spars are 1/16" sheet balsa, ribs 1/16", edges 1/8". Note that base rib of stabilizer is 1/8" sheet; base rib of fin 1/16". Both are braced internally with 1/32" sheet as shown on the plans.

Cover each side of all tail units with one piece of tissue. Run grain spanwise. Attach tissue first at one end. Dope fast at other end and pull taut. Then attach edges. Surfaces are finally sprayed and pinned to the bench to dry. Brush with thin clear dope after covering is thoroughly dried.

Cement tail surfaces in place on the fuselage. The crevices that remain at the junction of surfaces and fuselage after cement has set are filled with a mixture of clear dope and talcum powder. This mixture does not pull the paper and can be readily sanded.

Wings

With the exception of the butt or dihedral rib, which is cut from 1/16" sheet—rib A—all wing panel ribs are built-up. All are cut from 1/16" sheet balsa by using the full size pattern on plan, viz: 12 strips approximately 1/16" wide are cut to match the top camber of pattern and 12 the bottom. The leading edge is 1/8" x 5/16"; trailing edge 1/8" x 1/4", full-cut. To assemble, pin the edges—already shaped—to the bench. These edges are held the proper distance above the bench by numerous little strips of wood of the required thickness. Attach the bottom camber strips by cutting the necessary trim 1/3 from the leading edge portion and 2/3 from the rear of each piece. Cut the spars from 1/16" sheet balsa to match the pattern given in the drawings. Cement the spar to the bottom camber rib pieces. When dry, fit the upper camber pieces and cement. The tips are cemented in place before being cross sectioned. When firmly set, trim them to match the tip slant and sand. Block up the tip of each panel 1-3/4" from the bench and cement the 1/16" sheet butt rib in place perpendicular to the bench. Brace securely with 1/16" square strips as shown.

Covering is done in the same manner as the tail. Paper grain is spanwise, so that excess pull will not cause depressions between ribs.

Cement the completed panels to wing stubs.

Cowling, Propeller and Motor

Cut four soft balsa discs exactly 3" in diameter. For clarity designate them 1, 2, 3 and 4. From two of them—numbers 3 and 4—take off 1/16" around the entire circumference. Laminate cross grain numbers 1 and 2. Cut a 5/8" square hole through the center of number 3. Having first cut out with a coping saw a hole 2-1/8" in diameter through 1 and 2, laminate number 3 cross grain to number 2. Cut strips 2" wide from 3" wide, 1/16" sheet balsa. Select wood that is easily bent. Note that number 3 disc is smaller in size than number 2. Around the entire circumference of number 3 bend and cement the 1/16" shell. Cut a hole 1-1/2" in diameter through number 4. When dry, slide number 4 disc into the rear, flush with the rear edge, pin temporarily and cement. Once the cement has set, shape the cowl nose and sand.

Make the engine plug as shown on the side view and in the detail. Plug is removable for winding. Bearing is a 1/4" washer, cemented in place. Cut two of them from tin and bend two prongs on each. Cylinders are seven in number and are cemented to face of number 3 disc. Cross section of cylinder is given. Real ship had a double row job of 14 cylinders. Cement cowl to ship.

The three-bladed propeller is assembled before carving, as detailed. Cement must be allowed to dry overnight and should be copiously applied. Carving is conventional, need not be explained. However, the hub triangles may be partially cut out as deemed judicious while carving.

The prop is balanced two blades at a time. Select the lightest two first and work the heavy blade down. Balance two blades, then rotate prop to balance third against one of the original pair. Repeat as often as necessary. Pin points pushed into the tips with the grain as balance will do in an emergency.

Attach the shaft to the prop, pass the washer over the shaft, cement to the rear face of hub. Place a friction washer and the plug on shaft and bend the rubber hook.

Power is 8 strands or 4 loops of 1/8" flat. The motor is worked into place by using a wire hook. Suspend the rubber above the nose and, while holding the ship perpendicularly, drop motor through cowl opening.

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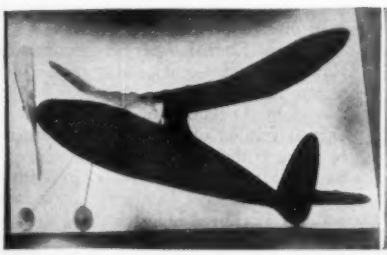

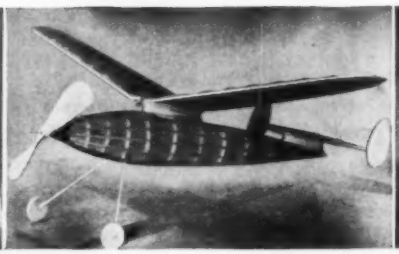

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Replica of the famous Curtiss P-40 whose speed is estimated at 400 mph. This flying model has small changes necessary to improve flying performance. You'll be the envy of every boy when they see this low wing, speedy military model. Wings and fuselage finished in aluminum tissue. Celluloid motor tube insures against damage from breaking rubber.

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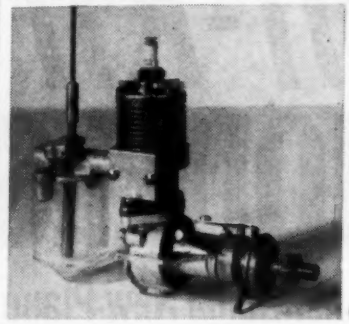

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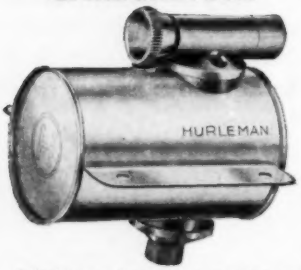

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FOR DETAILS

UNITED STATES MODEL AIRPLANE CO.
174 MAIN STREET ORANGE, N. J.

Attach plug and prop unit after rubber is engaged with rear hook. Opening may be cut near rear hook. Add guns, air scoop and other details.

Painting

Give the wood portions—viz: cowl, prop, struts—a coat of clear dope. Sand lightly. Entire job is finished with high-grade *aluminum* paint. Silver dope may be substituted, however. Black tissue stripes are used to designate controls.

Flying

Give the propeller a few turns and hand-launch the model over deep grass if possible. A small lead weight in the cowl will counteract any stalling tendencies. Should the job be nose-heavy, as low-wings frequently are, place a small weight in the tail. Trimming by bending tail surfaces is not advisable inasmuch as warping adjustments change themselves from flight to flight. Once the balance is obtained, increase turns gradually, feeling out the characteristics of your job.

The original model was balanced neatly on its first test. The ship flew abnormally fast, possibly because of the "streamlined" section and high wing loading. Climb is shallow but fast. Incidentally, don't forget a drop of oil on the propeller shaft bearing.

BILL OF MATERIALS

7 1/16" sq. x 36" hard strips, stringers
1 1/8" x 1/4" x 24" hard strips, trailing edge
1 1/16" x 1/8" x 4" hard strips, stub leading edge
1 1/8" x 5/16" x 18" hard strips (can be cut from 1/8" sheet), leading edge
1 1/16" x 3" x 36" firm, full-cut, sheet balsa bulkheads, etc.
1 1/16" x 3" x 36" soft sheet, cowling, tail ribs, etc.
1 1/4" x 3" x 12" soft sheet, cowling
1" sq. scrap 3/8" strut attachment
1 1-1/8" x 1" x 3" soft block, fillet block
1 1" sq. x 1-3/8" soft block, tail block
1 1-1/8" sq. x 3/4" soft block, plug
3 4-5/16" x 1-3/8" x 1" medium blocks, prop blades
1 pair 1-3/4" or 1-7/8" celluloid wheels
1 1/4" diameter 4" hard dowel
2 ft. .028 music wire
Japanese tissue, dope, cement, paint as required
8 ft. 1/8" flat rubber

All blocks can be cut from small balsa plank.

"Chuting" Your Model

(Continued from page 11)

it from a kite, a gas or rubber powered model, or even a real airplane.

Quite a successful method also used is that of wrapping the chute around some heavy object such as a stone and hurling it up by arm power. In this case the rock, or other heavy object will carry the chute up to the apex of the flight and as it starts to come down the chute will unravel from the rock and float down as gentle as you please. The chute should be carefully wropped around the rock to prevent it from snagging.

Other uses, such as using the chute to lower a model plane as shown in the photograph, will suggest themselves to you as times goes on and it will be a source of never-ending fun.

By varying the weight placed on the chute the rate of descent may be controlled. A very light weight tied on the end will cause the chute to float about for many minutes, depending upon the air currents and the location of the flight. Playing with the parachute in this manner, much practical knowledge may be obtained about air currents.

Frontiers

(Continued from page 17)

for they will be the fastest transports ever to fly around South America! The span is just 95 feet with a length of 73 ft. 2 in.

In the front will be a nose wheel and a new innovation for a small four-engined transport will be used of two wheels coupled together, side-by-side at each landing gear unit. While Douglas is going to relieve us of the agony of looking at the massive three-vertical surfaced tail by only designing one rudder on the 1940 version of the DC-4, Lockheed still intends to employ three rudders, which however are more becoming than the Douglas.

With one English order for reconnaissance planes completed and another on the books, a new third order of $20,000,000 has been gained by Lockheed which will be an advanced version of the "Hudsons" and may be more in the bomber class. Douglas also has a $20,000,000 order from Great Britain for some fast light bombers. These Douglas and Lockheed ships, both of the latest twin-engined design, will compare with the North American B-25 and Martin B-26 for the air corps. And the latest light or medium bomber of today is the real super-airplane. It should do at least 350 m.p.h. with full load and a crew of five. That is a conservative figure! It is difficult to believe that a twin-engine plane with a span of about 80 feet and loaded to the brim with bombs and fuel could produce a speed well up near the 400 m.p.h. mark . . . but that is the case of the new modern bomber! With the advent of the 2,000 horsepower engine, the designers have decided to depend a lot on that maximum power for the take-off of their airplanes, and the way they have created these new designs of over 350 m.p.h. is by raising the wing loading to unheard-of heights.

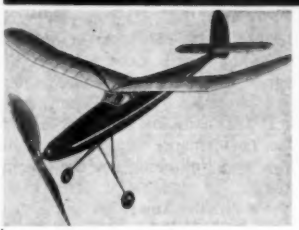
Just a few years ago Sikorsky was bragging that their four-engined Clippers could take off on long over-water hops with a

wing loading of 35 pounds. Later it was big news when we said that new trans-ocean flyingboats would go up to 40 pounds per square foot. But to match the bombers in the offing, 45 pounds per square foot is a conservative figure and 50 pounds is not far off for proposed stratosphere bombers! Those last figures are for military overload of course, with normal load five to six pounds less. For long distance missions against the Germans or Russians the airplanes will, however, take off in the design overload condition. Douglas' little DB-7 ships have wing loadings of about 30 lb./sq. ft., but forthcoming Douglas bombers will be higher loaded. It will be several months though before the Allies can purchase the ripest of bombers because 2,000 hp. engines are not yet available for export and the U. S. Army Air Corps is buying up the present supply mighty fast. But the fact still remains that they will get them eventually; Germany and Russia are too oppressed to perform any engineering miracles by producing anything to match these super bombers. They may get up to 1,500 hp. engines, but not 2,000 hp. . . . and if they do get to 1,500 we will be at 3,000!

Pratt & Whitney is making extensive preparations for the development of such aircraft engines and one of their latest steps in that direction has been the purchase of a new Vultee specially designed for testing various types and sizes of aircraft engines in flight. It is a two-place low-wing monoplane much on the lines of the "Vanguard" but somewhat larger. It has an extraordinarily long nose which may be altered to conform with numerous engine installations. This is probably the first time an airplane has been expressly designed and built for the testing of aircraft engines. The plane is now being test-flown in more or less obscurity, but we hope to have more facts on it later.

Though the engine is playing the most important part in the development of the modern bomber, the nose wheel has proven so successful that landing speeds from 80 to 85 m.p.h. are permissible in normal military operation, and this is another good reason why wing loadings are allowed to go so high. The Lockheed has a landing speed of 79 m.p.h., and the manufacturers have the safety of the passengers in mind. As a bomber this plane could have a much higher landing speed, thus more weight could be added in the form most likely of higher horsepower engines. With landing speeds well in hand the big problem is take-off. The Lockheed "Excalibur" requires a run of 950 feet to clear a 50 foot obstacle at normal horsepower. This could also be enlarged upon for military purposes provided the enemy does not shorten some of the runways with shells. It would be most inconvenient to have a shell hole smack dab in the center of a runway when one of these new bombers takes off; it will take them all of half a mile to get into the air. Everything must be in readiness, with the plane at the extreme end of the runway; the pilot will swallow hard and then give the ship the gun. It will be similar to being shot off a catapult, for the planes will have the fastest acceleration of any other twin-engined airplane in the world today. Though these bombers will

BERKELEY MODELS IN A CLASS BY THEMSELVES



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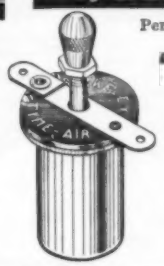

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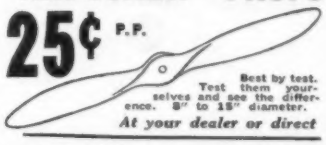

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3¼" dia.	Pr. 1.50	3½" dia.	Pr. 1.50
3½" dia.	Pr. 2.75	4½" dia.	Pr. 1.75
4½" dia.	Pr. 2.75		

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1" 9 Cylinder 15c
1½" 9 cylinder 25c

Celluloid Motors	Metal Plate
1½"	9c 5c
2"	12c 5c
2½"	14c
3"	17c 5c

PURSUIT GUNS

¾" ....2 for 5c
1" 3c
1½" 5c

Browning Guns

¾" ....2 for 5c
1¼" 3c
1½" 8c

LEWIS GUNS

¾" ....2 for 5c
1¼" 3c
1½" 5c
2" 8c

Dummy Ratchet Gun

¾" long 5c

MARLIN GUNS

1¼" 5c
2" 10c

SPANDAU GUN

1½" 5c

VICKERS GUN

1¾" 5c

Anti Aircraft Gun

2" 25c

Ring Mount Guns

1¼" Type B 20c
1¾" Type A 25c

Swivel Type C

2" d'ble action 8c

Wing and Tail Lights (Dummy) 3 to Set

Small 9
Medium 12
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Alum. Disc Tired Wheels	Rubber Wheels
½" dia.	5c ea.
⅝" dia.	6c ea.
¾" dia.	7c ea.
⅞" dia.	7½c ea.
1" dia.	8c ea.
1¼" dia.	9c ea.
1¼" dia.	10c ea.

Treaded Tire Alum. Disc Wheels

1 3/16" dia. 30c pr.
1½" dia. ..... 40c pr.
2" dia. ..... 50c pr.

AXLES—Threaded & fitted with washers, bushings and nuts.

LGTHS	⅛"	⅜"	½"
2"-3"-4"-5"-6"	.12	.10	.20
7"-8"-9"	.14	.12	.23
10"-11"-12"	.8	.15	.25

WHEELS

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Aluminum Disc Bal. Tired Wheels

1½" dia. 15c
1¾" dia. 18c
2" dia. 20c

Celluloid Balsa Wheels Wheels

⅝" ..... 5c pr. 4c pr.
1" ..... 7c pr. 5c pr.
1¼" ..... 10c pr. 7c pr.
1½" ..... 14c pr. 10c pr.
3" ..... 30c pr. 13c pr.

Do-Nut Air Wheels Sponge Rubber Tire

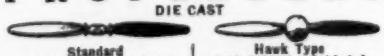
1" dia. ..... 10c pr.
1¼" dia. ..... 14c pr.
1½" dia. ..... 18c pr.
1¾" dia. ..... 20c pr.
2¼" dia. ..... 50c pr.

Axle Fork & Swivel

½" to ⅝" wheel 10c
⅝" to ¾" wheel 15c

PROPELLERS

DIE CAST



Standard 2 bladed		Standard 3 bladed	
1½"	5c	1½"	8c
2"	7c	2"	10c
2½"	8c	2½"	15c
3"	10c	3"	20c
3½"	12c	3½"	25c
4"	15c	4"	30c
4½"	22c	4½"	35c
5"	24c	5"	40c
5½"	25c	*6"	45c
6"	30c	*7"	50c
6½"	35c	*8"	55c
7"	40c	*9"	60c
*8"	45c	*10"	70c
*9"	50c	*11"	75c
*10"	60c	*12"	80c
*12"			

Hawk Type 2 bladed		Hawk Type 3 bladed	
3½"	18c	4"	25c
4"	20c	4½"	30c
4½"	22c	5"	35c
5"	25c	5½"	35c
5½"	30c	*6½"	50c
6½"	35c	*7"	55c
*6½"	40c	*8"	60c
*8"	45c	*9"	65c
*9"	50c	*10"	70c
*10"	55c	*11"	75c
*11"	60c	*12"	80c
*12"	65c		

*SANDCASTINGS in the rough. Drilling shaft hole 15c extra. *Postage 5c up to 6" dia. larger sizes 6c.*

SPUN ALUM. COWLS

Diameter	Drag Ring	Open Face	Closed Face
⅝"	10c	13c	13c
1"	10c	13c	13c
1½"	13c	15c	15c
2"	15c	18c	18c
2½"	18c	20c	20c
3"	20c	25c	25c

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be able to get into the air filled to the brim with bombs it will be absolutely necessary to dump all their "payload" before attempting a landing.

Here are some shining examples of our twin-engined bombers that are available to the Allies. The first, North American NA-40A; second, the Stearman YA-21. The NA-40A is a development of the NA-40 but perhaps will have more of the resemblance of North American's new medium bomber, the B-25. When 2,000 hp. engines are available for these airplanes the performance figures will be boosted way up. Following are the specifications:

	North Amer. NA-40A	Stearman
Span	67'6"	65'
Length	51'5"	53'9"
Height	14'10"	12'5"
Wing Loading	39.35 lb.	29.9 lb.
Power Loading	7.5 lb.	6.51 lb.
Weight Empty	16,000 lb.	12,760 lb.
Useful Load	7,997 lb.	5,470 lb.
Gross Weight	24,000 lb.	18,230 lb.
Fuel	900 gal.	450 gal.
Top Speed	310 m.p.h.	275 m.p.h.
Cruising Speed	256 m.p.h.	250 m.p.h.
Landing Speed	84 m.p.h.	72 m.p.h.
Service Ceiling	26,000 ft.	25,000 ft.
Cruising Range	1728 mi.	1200 mi.
Rate of Climb	1880 ft./min.	3,178 ft./min.

The North American is powered by Wright GR-2600 engines rated at 1350 hp. and the Stearman has Pratt & Whitney Twin Wasps rated at 860 hp. cruising.

The bombers for our Air Corps will be equipped with Browning 30 and 50 caliber machine guns and 37 mm. cannons, while bombers for export may be equipped with any number of foreign makes of guns. The Madsen 20 and 23 mm. light aircraft cannons are very popular today among foreign countries and Curtiss has designed an excellent installation for mounting one under each wing of their P-36 series for South America. With a gun in the nose, extreme tail, top, sides and bottom amidships, together with ultra speed, the bombers will not be in great need of escort service.

The French are toying with the idea of purchasing small, low-priced pursuit planes in large quantities to send out in droves as if from a bee-hive at a minute's notice, when enemy bombers are in sight. This looks like good business for Ranger's V-12 engine. They will be single place of course with wingspread of about 25 feet. That appears to be a practical idea so long as Germany or Russia does not make extensive improvements in their planes. Turning the tables, Germany and Russia would be at a loss with such aircraft against the super bombers mentioned previously, because of their speed and high altitude flying. They cannot keep a wall of hot T.N.T. in the air forever either. The attacking planes just have to wait out of range until the barrage is over before breaking through. And the Allies can assure Mr. Hitler that it will not be any "Fourth of July" celebration when they do. If the Allies can get the American equipment soon enough and use it to its fullest extent, that is offensively, they may be successful.

Ryan's new YO-51 Air Corps observation plane has created quite a sensation since its debut last month. Called everything from a "Dragonfly" to a "Flying Motorcycle" by the press, the airplane has nevertheless held its own with a very surprising performance. It can rise almost vertically and land in the same manner as if it were an autogyro. Therefore it requires only a very short take off run and can be operated from any shell ridden farm land to accompany infantry divisions. Fowler flaps extend from wing tip to wing tip on the high wing parasol monoplane, and the differentially controlled ailerons move in the up position only. Automatic slots cover the entire leading edge of the wing. Spoilers are located on top of the wing to provide faster descent. The wing span being 52 feet and with slots and flaps, the lightly loaded plane is likely to "float" for miles when coming in for a landing. The pilot and his observer are not likely to be enthused about doing forced sailplaning through the air when a battle is raging, and thus spoilers are provided to make a hasty landing in an obscure place where the bushes are thickest. These airplanes will take the place of captive balloons and though they are no speed demons they will have sufficient speed for their purpose.

A 420 hp. Pratt & Whitney Wasp engine is mounted in the nose of a long slender fuselage. The approximate weight is 3,900 pounds, length 34 ft. 5 1/2 inches and height 11 ft. 1 inch. The wing is of wood, strut-braced two-spar construction, two panels of which are pin-jointed to the cabane strut. The entire surface of the wing is covered with plywood. Chord: 92 1/4 inches.

While North American Aviation is digging into Ryan's business with their new NA-35, Ryan uses one of North American's features of construction in their fuselage on the YO-51 . . . the use of steel tubing in the forward section and semi-monocoque all-metal construction aft of the rear cockpit. Both cockpits are open and provide two-way radio equipment so that the crew can advise who is sneaking up on whom. The control surfaces are of metal frame construction, fabric covered.

All the lightplane manufacturers are having another one of those old-time sieges at Wright Field in conquest of orders. North American has their NA-35 present which appears to be the plane to beat. We hear Ryan was also entered but dropped out and Fairchild has their low wing plane in the competition for training planes.

Now we give you specifications on Bell's new piece of dynamite, the single-place interceptor-pursuit Airacobra:

Wing Span—34 ft.; overall length—29ft. 9 in.; top speed—400 m.p.h.; cruising speed—325 m.p.h.; landing speed—70 m.p.h.; maximum ceiling—36,000 feet; gross weight—6,000 pounds; wing loading—28 lb./sq. ft.

A 37 mm. aircraft cannon fires through the gear mechanism in the nose that connects the propeller to the long prop shaft extension from the engine in the rear of the pilot's cockpit. Four synchronized machine guns are also incorporated. In the extreme tail of the airplane are the oil tank and radio equipment with the leading edge of the vertical fin acting as the antenna.

The new Douglas DC-4 transports, though not as large as their prototype, will

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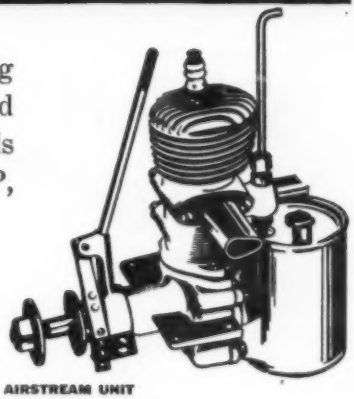

SPECIFICATIONS—Displacement .57 cubic inch—bore 9/10—stroke 9/10—two cycle ¼ **horsepower at 6500 r.p.m.** Height overall including spark plug 4½ inches. Length overall 5".

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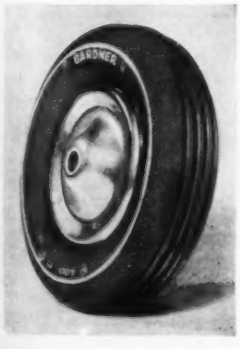
The Original **MERCURY MIDGET**



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6.00 x 17.....**$1.10 each**
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The Tom Thumb is the most powerful easy starting 1/5 H.P. engine made. Clip the coupon below, enclose money order for $7.50 (also your old motor for special $6.00 offer), and receive a *brand new* assembled and block tested Tom Thumb. Complete with fuel tank, coil, Champion spark plug, one piece cylinder and head and other modern features. Complete flying weight 10 oz. (less batteries). Bore 7/8"; Stroke 3/4".

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carry 40 day passengers and 22 night passengers. Forty of them are being built. As stated before, they will have just one vertical tail and will top 262 m.p.h. Cruising speed while in service will be down around 225 m.p.h. which is still fast.

Beech is making deliveries of their F-2 photographic 7,000 pound airplane to the U. S. Air Corps. Powered by two 350 hp. Pratt & Whitney engines, the airplane is loaded with camera equipment of the finest make. Fourteen of these go to the army.

The new Brewster mid-wing fighter for the navy, the F2A-2 is powered by a 1,200 hp. G-200 Wright Cyclone. The new Wacos this year will have all-plywood wings. Having completed an order for SNJ-1 planes for the naval reserve, North American is now at work on an order twice the size for SNJ-2 airplanes. They are very similar to the BC-1A basic combat ships that are being supplied very rapidly to the air corps.

The first of a production order of Curtiss-Wright Interceptor-Fighter planes, now being built by the St. Louis (Mo.) Airplane Division of the Curtiss-Wright Corporation for a foreign government, climbed well over 5,000 feet in 60 seconds and otherwise demonstrated its powers as a weapon against invading bombers during flight tests completed late on Wednesday, March 20th, near Lambert-St. Louis Airport, according to C. W. France, vice-president and general manager of the local organization.

"The all-around performance of this first production model," said Mr. France, "definitely identifies it as the fastest climbing type of airplane in the United States as well as the fastest climbing airplane in the world, to our knowledge."

Commenting further upon the Interceptor-Fighter's increasingly important role in modern warfare, Mr. France pointed out that this type of military plane has proved it is much more effective than anti-aircraft batteries in combatting high-flying enemy bombers because of its mobility and the rapidity with which is may be directed against an attack. By the use of radio communication with ground and air forces, he explained, the Interceptor-Fighter becomes an even more deadly weapon of defense.

The Curtiss-Wright Interceptor-Fighter is a single-place, all-metal monoplane powered by a Wright Cyclone engine delivering over 1,000 hp., incorporates the latest military aircraft innovations including a newly developed "Tell-Tale" device which checks the plane's functioning for the pilot; is completely streamlined from the faired doors which house its retractable landing gear to the cowling over its power plant; and mounts four machine guns which are synchronized to fire through its propeller disc. In addition, it offers provisions for radio communications and high altitude operations requiring the use of oxygen.

The Interceptor-Fighter is smaller than the Curtiss P-36 Pursuit type (standard pursuit plane of the U. S. Army Air Corps) or the Curtiss Hawk 75A Pursuit (used by the French Air Force) and is much lighter, weighing but 4,250 pounds loaded. While recognized principally for its rate of climb and maneuverability, it has a speed of well over 300 m .p.h.

Special Notice

The Middle Atlantic States Rubber Power Championship Contest will be held on Sunday, May 26th, 10 A.M. to 4 P.M. at Delawanna Airport, River Road, Clifton, N.J. (Rain date, June 2nd). Events will be: Jr. Fuselage, Sr. Glider, Stick and Fuselage. Prizes will consist of $50 in cash, motors, kits, subscriptions to MODEL AIRPLANE NEWS, etc. The contest will be sponsored by the Clifton Evening School Model Club, Clifton, N.J. Write care of Mr. Casano.

A 40 Minute Record Breaker

(Continued from page 15)

Flying

Use rubber spaghetti tubing on rear hook and propeller hook. Attach rubber strands on both hooks, using special 1/4 inch diameter rubber tubing on front hook. This special tubing gives the model a smoother running propeller as it reduces wabbling caused by the rubber strands knotting up at the hook. Lubricate the rubber well with a mixture of one-half liquid soap and one-half glycerine. The original model had twenty-two strands of 1/8 inch flat brown rubber on its record flight. Attach the wing with 1/8 inch flat rubber; making sure the wing has about three degrees positive incidence. Test glide the model first and make minor adjustments before attempting power flights. The model flies opposite torque, both underpower and in the glide.

Building the Double Duty Gas Model

(Continued from page 19)

note that no damage was suffered by the pontoons whenever it didn't land on the water.

Incidentally, that's where our name of "NOMAD" came from, for the ship's ability to wander off the lake.

But, Boy, you haven't lived until you've seen your ship coming in for a landing on the water, hit the water—bounce into the air again and finally hit the water again and coast to a stand-still—Man, what a thrill!!!

The strength of the ship is amazing. Several times the motor has cut just when it started to climb and of course it came in in the usual way, nose first at right angles to the ground with no damage whatsoever. But that's enough talk—let's get busy on the construction of this "Double Duty Gas Model."

Fuselage

The first step in construction of the fuselage is to draw a full-size side-view layout of the fuselage on an unwarped surface. Make sure that all the bulkhead positions are marked off correctly as this is very important.

You will notice that there are ten fuselage bulkheads. Bulkheads B1 and B2 are located on Plate 4 and bulkheads B3 to B10 are found on Plate 3. Bulkheads B1 and B2 are cut out from 1/8" birch plywood and are drawn to full size. Bulkheads B3 to B10 are all cut from soft 1/8" sheet balsa and are shown 1/4 actual size. All bulk-

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—Each piece accurately sawed to true dimensions
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—assures the uniformity essential for scientific model construction
—Selected Balsa is of first quality. Only A1 stock is used.

IN 18" STRIPS

1/16" x 1/16"	5 for 1c
1/16" x 1/8"	4 for 1c
1/16" x 1/4"	3 for 1c
3/32" x 3/32"	3 for 1c
3/32" x 3/16"	3 for 1c
1/8" x 1/8"	3 for 1c
1/8" x 1/4"	1 for 1c
1/8" x 3/8"	1 for 1c
3/16" x 3/16"	1 for 1c
1/4" x 1/4"	1 for 1c

IN 18" SHEETS

1/32" x 2"	1 for 2c
1/16" x 2"	1 for 2c
3/32" x 2"	1 for 2½c
1/8" x 2"	1 for 3c

24" and 36" lengths available on order

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heads except B1 and B2 are made in two halves, that is a left half and a right half. B1 and B2 are made in one piece each.

The half-shell system is used in constructing the fuselage.

Pin all the bulkheads in their proper upright positions on the full size drawing of the side of the fuselage. Make sure they are at right angles to the working board. Check with a triangle. Of course B1 and B2 cannot be pinned on the drawing because they are each in one piece, not in halves.

Now that all the bulkheads except B1 and B2 are pinned on the drawing, start planking the half of the fuselage that is on the drawing with very soft strips of 3/32" by 1/4" balsa. Start the planking strips at B10 and extend them six inches past B3. That is, leave enough of the planking strips extended out to allow you to install B1 and B2.

Plank the entire side of the fuselage but leave open about one inch at the very top and one inch at the very bottom of the bulkheads. This is to allow a stronger connection between the two fuselage halves. When planking use very thin cement but use plenty of it. Make sure that you don't get any cement on the planking that is extended beyond B3 as the shape of the body changes quite a bit at this point and you can't glue the planks together until B1 and B2 are put in their proper locations. Allow the planking to set overnight on this side of the fuselage.

After you are sure that the cement has set on the planking and bulkheads, remove it from the board. Now, very carefully, glue the other or second halves to the first halves that have the planking strips connecting them.

When the bulkheads are strongly cemented together, start to plank the other side in just the same way you did the first side, leaving a small space open on the top and bottom.

Now bend the front and rear landing gear struts to their correct shapes and bolt them to B1 and B2 with strips of dural and nuts and bolts. Then glue the two hardwood bulkheads B1 and B2 in their proper place, at the nose of the fuslage, and cement the planking strips to them.

Before planking the spaces left open on the top and bottom of the fuselage, install the brass motor bearers and cement them very firmly to B1 and B2. Also put in the wiring system and mounting the coil and condenser in their proper positions. Between B2 and B4 two strips of 1/4" square are glued in the notches provided for them. These two strips help brace the wing mount.

Now fill in the spaces at the top and bottom of the fuselage with planks.

The nose block and the tail block are carved from very soft and light balsa; the nose block is hollowed out and drilled for an oil drain, then the nose block and tail blocks are cemented in place.

Now that the fuselage is complete in structure, start to sand the planking using rough to fine sandpaper until all bumps and ridges are gone. After the planking is all sanded smooth, cover it with silk or light bamboo paper. Use thick clear dope to ap-

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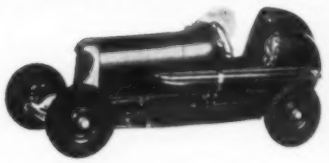

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Approved automotive engineering principles are embodied throughout. It's the most *complete* racing car on the market. Speeds in excess of a mile a minute have been recorded. The Rocket is made in Detroit, "The Auto City."

Wheelbase 13 13/16"; overall length 19½"; weight 7½ lbs.; height 7½"; diameter of wheels 3¾".

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Kit comes complete with assembly drawing and all necessary hardware.

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ply the silk or paper. Apply several coats of clear dope over the silk or paper and sand with 10/0 sandpaper. Two or three thin coats of colored dope is now applied to the fuselage. The color choice is optional of course. The original was silver with red trim.

The timer and battery box are now installed in their places. The battery box is cemented to a floor board of 1/8" sheet balsa between B3 and B4.

The motor may now be bolted in place.

Tail Surfaces

The rudder and stabilizer are comparatively simple to construct.

Full size drawings will be required of the rudder and stabilizer in order to make them correctly.

Cut the leading and trailing edges of the stabilizer from medium sheet balsa, 1/4" thick. Pin them down on the plan and also pin the stabilizer spar which is 1/4" by 3/16" balsa to the plans. Cut the ribs from strips of 1/8" by 1/4" balsa to correct lengths and glue them in their proper locations.

When the cement has set, remove the stabilizer from the drawing and shape leading and trailing edges. That's all except the covering.

The rudder is made in just the same manner that the stabilizer was with these few exceptions; the rudder spar is 8-1/2" long and extends from the very top of the rudder to the very bottom of the underslung part of the rudder.

The stabilizer mount and the underslung rudder are cut out from 1/4" hard sheet balsa and cemented in place. Note the grain on these pieces of wood.

When assembling, first cement the rudder to the stabilizer and then cement the rudder spar to B10 and the tail block and the underslung part of the rudder.

Cover the rudder and stabilizer with Jap tissue and give two coats of thin clear dope and two thin coats of color dope.

Wing

There is not anything hard about the construction of the wing. The only thing to watch out for is to be sure that while constructing it does not warp, and make sure that the dihedral is correct. Another thing to be careful about is when covering the wing be sure you watch your step when covering the tip because the airfoil changes from rib to rib here.

The first thing to do when constructing the wing is to draw a full size sketch of the entire wing.

The main wing spar is made first. This spar is made from hard 1/8" sheet balsa to the shape shown in plate 1. Particular attention should be paid to the dihedral joints and the taper of the spar at the tip.

While the glue is drying on the dihedral joints of the wing spar, start cutting out, from medium 1/16" sheet balsa, all the wing ribs. Twelve R1 ribs and two each of R2 and R3 will be required.

First, one section of the wing spar is pinned in place on the plans and then the ribs, leading and trailing edges are cemented in place and then the two supporting spars of 1/8" square are inserted in place and cemented. After this has set, remove from the plan and do the next wing section until you have completed the wing. There are four sections, they are the two tip sections and the two center sections.

Now the leading edge is covered with 1/32" soft sheet balsa. This not only gives strength but also helps keep up the camber, that is, prevents sag between the ribs.

At the center section small fairings are either carved out of a solid block or built up from sheet balsa to fair in with the fuselage bulkheads.

The author covered his wing with silk but if preferred, bamboo paper may be used. Be sure that the covering sticks strongly to the bottom of the ribs in order to keep the airfoil shape. Notice how the airfoil changes from the tip dihedral joint to the tip. This is to reduce stalling at the tip.

Pontoons

Two pontoons will be required for hydro flying. There are only two things that are "musts" on the pontoons and they are: the pontoons must be absolutely water-tight and they must have the same amount of incidence that the wing has; in relation to the fuselage of course.

Cut all the pontoon bulkheads which are found on Plate 3 from 1/16" sheet balsa. Make two of each bulkheads, one for each pontoon.

The bulkheads are cemented directly on the keels in their correctly marked spots. The keels are cut from hard 1/8" sheet balsa.

After the cement has set, add the nose piece and the tail piece which are carved and hollowed from blocks of soft balsa. The six 1/8" square stringers are now added.

The bottoms of the pontoons are covered with 1/32" sheet balsa. Only the bottom need be covered with sheet balsa because the bottom takes most of the knocks.

The pontoons are now covered with light bamboo paper, water shrunk and then given between five and eight coats of clear dope.

Test each pontoon for leaks by submerging them in a tub of water for a few minutes. If there is a leak try to find it and remedy the situation. If you can't find the leak the only thing to do is to give the pontoon a few more coats of dope.

Notice that the pontoons are separated with a spreader bar 12" long of 1/16" wire. This is located just behind bulkhead P6. The rear strut is attached to this spreader bar with solder. The rear strut is long and has a curve at the top to fit the bottom of bulkhead B4. When the pontoons are attached this rear strut is strapped onto the fuselage with rubber bands.

Just in front of bulkehad P1 is a balsa block which contains a piece of 3/32" aluminum tubing. The landing gear axle fits into this tube when the pontoons are attached.

The water rudders are cut to shape from 1/32" sheet aluminum. These water rudders are necessary to offset the torque on the take-offs and keep the "NOMAD" on a straight course at the take-off. Faster take-offs may be had by placing an air-tube just behind the step.

Flying the Model

First we will take flying as a landplane, as it should be flown this way before it is flown as a hydro.

Before taking the ship out to your flying-

REAL ENGINE VALUE—$4.95

Here is your opportunity to buy a kit of the famous G.H.Q. Gasoline Motor. ABSOLUTELY COMPLETE—ALL MACHINING DONE—READY TO ASSEMBLE. All you need is a screwdriver. No mechanical knowledge required. BUILD YOUR OWN ENGINE AND SAVE!!

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Everything is in the kit including Champion spark plug, coil, condenser, tank and cap, ignition wire, cylinder, piston, connecting rod, timer, crankshaft, all screws, nuts, bolts, complete instructions, etc. Every part is fully machined and finished. No oil, gas, batteries, or propeller included. A SCREWDRIVER IS THE ONLY TOOL YOU NEED.

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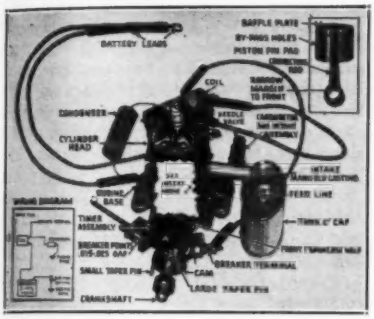

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4 Port 2 Stroke Cycle. ¾" Stroke. 15/16" Bore. 300-7,000 R.P.M. Turns 14" Prop. 8" Pitch. Bearing Surface, 1¼" Long. Crankshaft, 5/16" Diam. Weight, 10 oz. (Motor) Rotation, Either Direction. Height, 4½"—Width, 2½", H.P. Approx. 1/5th.

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Thousands of Satisfied Users! Read some of these testimonials on file with us:

J. B., Providence, R.I.—"A few weeks ago I received the G.H.Q. motor kit and it is running perfectly. I hope to write you soon and tell you about some excellent flights."

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For gas engine operators who wish to become better acquainted with their hobby, G.H.Q. presents ten booklets covering the major points of miniature engine theory and operation.

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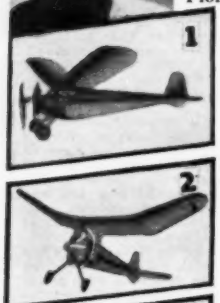

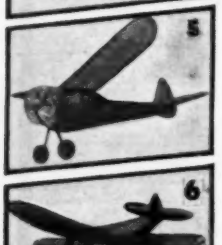

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field, check and run the motor at home, check the timer and be *sure* it works and be sure that your batteries are fresh; for if penlights aren't fresh the motor just doesn't start. It might be a good idea to add booster connections if you aren't sure of your batteries.

Be sure that you choose a nice calm day for your first test flights.

Start the motor and throttle it to a little more than half-speed and notice just how much pull there is, set the timer, head the "NOMAD" into the wind, and help it into the air by the wing tip, *don't* push, with just enough speed that there is pull in the motor.

We will tell you beforehand that the model will not stall but if it doesn't stick its nose to the sky and follow it there but settles back to the ground and runs along the ground till the motor cuts, this is what to do: First, try another flight, but this time advance the speed of the motor quite a bit. If it repeats its first attempts add about a quarter-of-an-ounce of modeling clay to the very end of the fuselage. This little weight is very effective because of the fuselage's long moment arm.

The model should turn to the left (with torque) and glide in large circles to the right when the motor cuts out. If the ship turns to the right or flies in a straight line when under power, add a very small aluminum tab to the rudder and use this for adjusting.

Of course the faster the motor turns over, the faster will be the climb and the tighter the spiral. Don't be afraid to fly the ship at wide open speeds because it will not spin in.

Now for hydro flying.

To convert the "NOMAD" into a seaplane just remove the wheels and insert the axles into the aluminum-tube housing of the pontoons and strap the rear strut of the pontoons to the fuselage with rubber bands. Then look around for a lake or large body of water.

The author has used the following methods to retrieve his model while flying off water: Row boat, kayak, small motor boat and swimming. Oh, yes, and running whenever the model flew away from the lake area.

Whether a land or seaplane the adjustments remain the same. The C. G. is not shifted the least bit.

Take your plane out for hydro flying only on a calm day. Get out to the middle of the lake and try to keep all other boats away.

Start the motor, set the ship in the water and let her go. In all probability the ship will not takeoff but turn around in left-handed circles until the motor cuts out. Get the model and set the water rudders to make the model go straight on the water. Now try again. If the model goes straight but does not take off, open the throttle more on the next flight and the ship will hop up on the step, then it will plane for a few yards, break water and head for the clouds and you head for the oars, flywheel, water or what have you.

Most of the landings on water are real thrills. The model glides in, the pontoons hit the water and the ship bounces up into the air again, then hits the water again and coasts to a standstill.

You might be interested in knowing that we have never had an upset water landing in all its flights; every one was perfect.

We feel sure that you will get a big thrill out of building and flying the "NOMAD," more so when you bring home the bacon from any contest in which you may enter her.

Good luck and keep your feet dry!!!!!

Eyes of the Army

(Continued from page 9)

modification of the navy's O2U-4. Using a Wasp 450 engine it had a top speed of 165 miles an hour. Although a successful naval type, the air corps evidently did not like it and ordered no service types.

The O-29 Douglas was a Pratt and Whitney powered O-25 type; while a later ship, the O-29A, used a Wright "Cyclone" engine. This design saw further evolution into the O-32 and reached its final stage in the O-38.

The O-31 series, by Douglas, is a rather unusual one. It was not only the first type to use a fabric-covered "gull" wing, but also was the first to use external wire bracing on such a monoplane type. These unusual "gull" wings offer the strength of a flush mounted panel and at the same time have the visibility and stability features of a parasol wing. The XO-31 and YO-31 were both of corrugated skin construction, while later types had smooth metal covering. The O-31B, having a fully enclosed cockpit, was built originally as an official ship for the Militia Bureau; while the last in the series, the O-31C, boasted a trim single strut landing gear.

All of the O-32A Douglases were redesignated as BT-2A's shortly after delivery so saw little actual service use as observation ships. These were in all respects like the O-29 but mounted a 450 horsepower Wasp engine.

As an experimental project the Thomas Morse Company undertook to fit Conqueror engines to a small number of O-19's. These jobs, known as YO-33's, were not generally as successful as the earlier ships.

Douglas made a twin engined observation ship soon after the Fokker O-27 was built, under the name of XO-35. This original model used a corrugated dural fuselage, but subsequent production ships discarded this type of construction in favor of a smooth metal-skin job. These ships were easily convertible into type B-7 bombers with the addition of bomb racks and sights. Top speed was rated as 179 miles an hour and cruising range was 700 miles, which put them in the long-range observation class. The O-36 was of the same general type, having direct drive Conquerors in place of geared powerplants.

O-38 Douglases are still in service in many parts of the country, both in national guard and reserve units. They have been used for some years for the combined duties of observation, photography, gunnery, bombing and in fact, all general utility work. 525 horsepower Hornets were used in the first three models, O-38, O-38A and O-38B, while the O-38D used a 575 horsepower Cyclone and was intended as an official Militia Bureau ship. The O-38E and F were still further improvements, having well-faired landing gear, fuselage and tail and having considerably better performance.

The O-38F, incidentally, marked the last of the Douglas biplane observation planes, all later types being the faster, more efficient monoplanes, which seem to be better suited for general observation work.

Just as Douglas was making its last biplane in this class, so Curtiss was completing its final "Falcon," the last in a long and successful line of army ships. Powered with a 600 horsepower Conqueror and boasting all streamlining possible on a biplane, it had a top speed of 172 miles per hour and reached a service ceiling of 29,900 feet.

Soon after this Curtiss came forth with the "Raven" YO-40B, a development of the experimental XO-40 sesquiplane, that had not been generally so successful. This small lower wing added but little to the all-around-performance and provided a blind spot downward. The first of these "Ravens," incidentally, crashed during a test hop when a severe wing flutter set up in a dive.

Thomas Morse was also trying its hand at an observation plane as the Curtiss "Raven" and the Douglas O-43 were being completed. Known as the YIO-41 it was a sesquiplane with a geared Conqueror engine and an all-metal corrugated fuselage. This ship "bounced," so to speak, so it was returned after considerable testing by the army.

The Douglas O-43 was really little more than a further development of the O-31, being an out-and-out parasol instead of a "gull" type. 24 of the improved O-43A's were made, after a short but thorough service test on the O-43. They have proved to be quite successful and are in use in a number of observation squadrons in the South at present.

The latest and fastest Douglas to appear is the O-46 series. A still further improvement on the O-31 and O-43, it has strut braced wings and uses a 750 horsepower P&W Twin Wasp Junior engine. When it first made its appearance in 1935, the XO-46 greatly impressed army officials and an order for 75 of the improved O-46A's was awarded. The ships constitute first line equipment along with the later North American O-47A's.

The O-47A is without a doubt the most efficient observation plane in existence today. The U. S. Air Corps has finally decided on a three-place, single-engined all-metal mid-wing ship for its standard observation type, and seems to have made a very good decision. Cruising at over 200 miles per hour and having a range of almost 1,000 miles, the O-47A provides more room and more complete facilities for all crew members than has ever been seen on an army ship of similar type. The photographer has an "office" in the belly of the ship, with folding doors on the bottom revealing a mapping camera and windows on either side sliding back for excellent unobstructed oblique shots. The radio man and gunner have a roomy rear cockpit, with full set of instruments and dual controls, while the pilot sits just forward of the tapered wing and commands an excellent view in all directions.

Although observation amphibions have been used to some extent in the air corps, they have seen little specialization until recent years. Existing types of Loenings, Douglas Dolphins made up the OA-1, 2, 3

COMPARE—THEN BUY

Pursuit-Aire "45"

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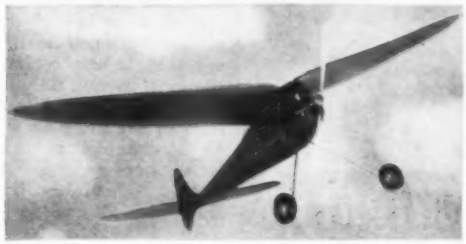
COMPLETE LESS WHEELS, MOTOR

CLASS "A" POWERED BY 1940 BANTAM Ohlsson "19"



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Dual Purpose Plane, was designed expressly to meet the exacting N. A. A. 1940 rules, contest and sport model builders requirements. The spontaneous response throughout the model world proves that we have achieved our purpose.

KIT 100% COMPLETE

including large full size plans with explicit details and instructions, highest quality strip and sheet Balsa, printed wood details clear and true, finest spring steel wire, selected AA colored tissue, all necessary hardware, 4 oz. Cement and 4 oz. Clear Dope.

Don't be swayed by fanciful advertising, but let results speak for themselves. See it, buy it, then fly it with the best of them, then feel the elation and receive the acclaim of a winner. Yes, this Class "A" and "B" ship is truly

the 1940 champion of champions.

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★ Length 26½ —beam 7½ .
★ Cast red bakelite hull—stronger than aluminum —lighter than wood—more beautiful than paint.
★ Mahogany bottom—may be altered to suit your own design.
★ Can be assembled in 4 hours.
★ Complete fittings—highest quality—including steps, vents, chocks, flag socket, hatch, propeller, strut, adjustable rudder, shaft, stuffing box, motor coupling, spray rails, trim, bolts, screws, etc. Nothing else needed except motor.

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FREE 60 1/16x1/16x18 Balsa, 1 bottle Cement and 1 pair 2" wheels—all FREE with orders of $1.00 or more (except kits or motors).

18" BALSA

1/16x1/16	100.	5c
1/16x⅛	35 for	5c
1/16x3/16	18.	5c
1/16x¼	15 for	5c
3/32x3/32	30.	5c
1/32x⅛	30 for	5c
1/32x3/16	12 for	5c
1/32x¼	10 for	5c
3/16x3/16	8.	5c
1/32x¼	6 for	5c
⅛ x ⅜	3 for	5c
⅛x1/16	5 for	5c
⅛x⅜	each.	2c
1/32x1/2	2 for	5c
1/64x2	4 for	10c
1/32x2	8 for	10c
1/16x2	8 for	10c
3/32x2	7 for	10c
1/8x2	6 for	10c
¼x2	3 for	10c
¼x1/2	3 for	5c
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¼x1	each	3c

3" sheets or 36" lengths, double above prices; 5 foot Balsa, double 36" prices. Add 10c pckge. chge. for 36" lengths—20c for 5-foot lengths.

SHEETS 12"x2"

1/16 or 1/ 32		10 for 10c
3/32		8 for 10c
1/8		7 for 10c
¼		3 for 7c
½		each 5c
1		each 7c
Champion Spark Plugs		.65
Masking tape, large roll		.25c

18" PLANKS

1x1	5c; ½x2	6c
1x1½	9c; 1x2	10c
1x3	15c; 2x2	18c
2x3	23c; 2x6	39c
3x3	40c; 3x6	75c

WIRE

6-8-10-12-14

2 ft.		1c
1/16 dia.	5 ft.	12c
.050	3 ft.	5c
3/32 dia.	5 ft.	15c
⅛ dia.	5 ft.	25c

PROP SHAFTS REAR HOOKS

12 for .8c

CAMEL'S HAIR BRUSHES

Small 3c; Lge. 5c
Extra large .8c
Flat, large .10c

PROP BLOCKS

½x⅜x6	6—5c
⅝x1x8	3—5c
⅝x1x7	3—5c
⅝x1¼x10	3c ea.
⅝x1¼x12	3c ea.
1x1½x12	4c ea.
1x1½x15	7c ea.

WHEELS per pr.

	Brch	Bisa	Celu
½	.01	.03	
⅝	.02	.04	.05
1	.03	.05	.07
1¼	.04	.08	.10
1⅝	.07	.10	.16
3	.15	.15	.30

REED

1/32-1/16 2 for 1c
3/32 or ⅛ 1 ft. 1c

Alligator Clips .2 for .15

INSIGNIA

24 and stripes 5c

COLORED DOPE

6c per oz.; Large bot. 10c; ½ pt. 35c

CLEAR CEMENT

5c per oz.; large bottle, 8c; ½ pt. 35c; 1 pt. 55c

CLEAR DOPE OR THINNER

5c per oz.; Large bottle, 8c; ½ pt. 30c; 1 pt. 45c

PROPELLERS

Balsa	Paul-O-Mach. Cut	Wisa
5" 4c		10c
6" 5c		15c
7" 6c		20c
8" 7c		25c
9" 8c		30c
10" 8c		25c
12" 10c		45c
14" 14c		
15" 15c		55c

TISSUE, AA

All col., doz. 10c
Silver ea. 5c
Superfine, wh. 5c

THRUST BEARINGS, dz.

Sm. 10c; lge. 15c

BATTERIES

Penlite .5c
Large or Ind. .10c
Battery Boxes
Penlite & 1" .40
Penlite, 1¼" .50

RUBBER

.045	.25 ft. 5c
1/16 sq.	.15 ft. 5c
⅛ flat	.15 ft. 5c
Skein	.35c
3/16	10 ft. 5c

BUSHINGS

1/16 4 for 1c

WASHERS

1 doz. ⅛ or ¼ 1c

NOSE PLUGS

½" 12 for 8c

15" BAMBOO

1/16x¼	6 for 5c
Shredded, 36"	5c

SPONGE RUBBER WHEELS

pair 1" .15c
1¼" .18c

PNEUMATIC WHEELS

3½" pair .$1.25

CELLULOID

6x8 .5c
12½x16 .10c

RUBBER LUBE

Bottle .10c
Paste, can .10c

GAS MODEL KITS

Buccaneer 48	$2.95
Buccaneer Standard	5.00
Comet Clipper	4.95
Comet Zipper	2.95
Comet Mercury	2.95
Imperial 66"	2.95

Add 25c postage on gas model kits

ALUM. TUBING

1/16,3/32,⅛,ft.	7c
3/16, ¼, ft.	10c
5/16 ft.	15c

SHEET ALUM.

.0004x4x15
2 sheets 3c
.005 in.—6x6 .5c
.010 in.—6x6 .6c
1/32—6x6 .15c
1/16—6x6 .30c
Smith Coil $2.50
Toggle Switch .30
Knife Switch .25
Booster Plug and Jack .10
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3x3x2	8c
3x3x3	10c
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White, 2 for .5c
Yellow, red, green or blue, each 10c
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Used Motors bought, sold, exchanged, or overhauled. Send in your motor for estimate. Motor returned at once if allowance is unsatisfactory.

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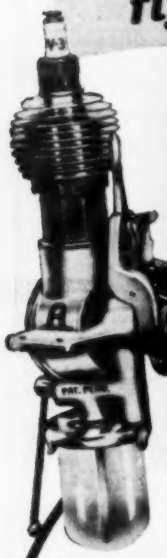

The Mighty ATOM is designed to take the "hard knocks" of competitive, exhibition and pleasure flights with maximum performance and minimum cost. Incidents which, ordinarily, might mean complete demolition or costly replacement and/or rebuilding are minor matters to ATOM flyers. This maintenance economy, on the average, saves you 60%. Guaranteed to develop highest power-to-weight ratio!

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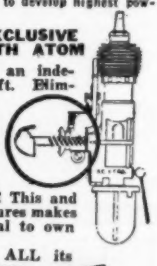

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and 4 types, while the only ship actually designed for this purpose was the huge all-metal YOA-5 Douglas "Super-Duck." Its type should prove valuable in the Hawaiian Islands, or other oversea possessions where range and seaworthiness are important.

A word or two on the autogiro would perhaps be timely at this point. Now in use both in this country and in several European nations, the autogiro has much in its favor, and it must be added, much in its disfavor. It comes up to the requirements for accurate spotting and ground photography very nicely, but for the present at least, falls far behind on speed, maneuverability and defense. In time high speed giros will likely be commonplace and should prove valuable for short range spotting and staff transport in the actual war zone.

As it has been seen, the U. S. Air Corps has finally adopted the monoplane exclusively as an observation type. The monoplane is not only stronger for the same weight but in most cases offers better visibility in the essential directions.

The engineering staff of the air corps, in cooperation with the various manufacturers, has devoted much time and effort to perfecting observation aircraft as it fully realizes that without efficient observation aircraft the work of all other branches of the service would be rendered almost useless. An example of this is the vital part they are playing in the Scandinavian war.

Gas Lines

(Continued from page 24)

spot landing event, his ship landing within a few feet of the circle after its motor had run the required fifteen seconds.

In the East one of the consistent winners is Leon Shulman, who has developed a very unique type of plane,with which he is shown in picture No. 2. Leon is one of the first "one wheel" advocates. As you can see, the fuselage is pulled down a considerable distance in order to reduce the length of the landing gear struts and to afford the proper cross sectional area to the fuselage. As you can note, the thrust line is above the center of gravity and the center of lateral area is practically on a line with the C.G. Every ship built according to this aerodynamic setup, so far, has performed perfectly.

There are some who claim that the position of the C.L.A. has little to do with spiral stability. Practice has proved otherwise; so perhaps in the future they will adjust their theoretical ideas to conform with practical results. Here is a little hint:

In order to obtain a straight flying ship keep the fin area low and the C.L.A. on the line of the C.G. To make a ship bank gently raise the C.L.A. slightly above the C.G. The farther above the C.G. line the C.L.A. is raised, the tighter will be the circle the plane will make, as a rule. There may be some exceptions to this in which other factors overcome this effect of the position of the C.L.A.; for instance when all of the fin area is below the stabilizer.

Apparently Walter C. Kutaj of 2602 22nd Place, Chicago, Illinois, favors Shulman's type of model also, for picture No. 3 shows the framework of the "Sky-Rocket," Class A gas model, designed by Shulman, with some changes made by Kutaj. The wing span is 36 inches, the area of the wing is 227.9 square inches. One of the advantages of this type of model is its extreme lightness, thus it is well adapted to Class A.

It has always been the dream of rubber powered fans to have a gas motor small enough to power models which otherwise must be flown with rubber. Picture No. 4 shows such a plane; a 30-inch rubber powered model has been successfully converted into a gas model by installing in it an Atom motor.

Bill Lukens, publicity manager of the Quaker City Gas Model Airplane Association, Philadelphia, Pa., sends us picture No. 5 which shows Walter Eggert with his beautiful job. The wings have been worked out in an exceptional manner and are similar in cross section, at any point throughout its span, to a bird's wing. In the fuselage it has a high camber which becomes less and less at each succeeding point nearer the tips. As you can see the fuselage is perfectly streamlined. Walter is the ace designer and flier of the Association and is one of its original members. He has been designing successful planes for many years.

Starting with a monthly meet on May 11, the Association is putting up a cup or cash award each month to be awarded to the Quaker City club member with the highest time at the meet. For information concerning the club plans, contact William Berry, 941 E. Price Street, Philadelphia. Contests will be held at the Northeast Philadelphia Airport.

Recently little has been heard of radio control jobs. Apparently many builders are shrouded in their workshops day and night, secretly working out ideas along this line. One interesting plane has come to light, however. It is a radio control plane built by John W. Ault of 2304 Shunk Avenue, Alliance, Ohio, which is shown in picture No. 6. It weighs 4½ pounds, has a 6 foot wing spread and has operated most successfully.

Picture No. 7 shows a close-up of the radio control unit. You will note how compact and simple it is—the materialization of a radio model fan's dream.

In picture No. 6 you will note the unit which operates the rudder at the tail of the plane. This is operated by the current from six pen cells. The transmitter has a tap switch so that it can be put at five different powers; that is, six volts input D.C. and from 115 volts output up to 300 volts. The flight direction is known on the ground by the position of the leather switch. This is an extremely important development. The switch's positions are left, neutral and right.

Virginia Lee Strange of 1008 N. Longbeach, Compton, Calif., sends us news and picture No. 8 of the Compton Winged Tartar Gas Model Club. This organization is only six months old but it boasts of 40 members. An annual trophy has been donated by the Playground and Recreation Department of Compton. The Club was organized by Willard C. Strange and at first there were only 12 members who flew under the name of Compton Gas Model Club. The Club has been well represented at contests held in the neighboring cities of San Diego, Taft, Santa Monica, San Bernardino and Los Angeles; several members placed high. Recently the group organized its own

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WING AREA ..... 171 sq. in. | POWER PLANT ..... Atom Motor
TOTAL WEIGHT (with motor) ..... 10 oz.

- Removable motor mount and ignition track
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- Cantilever wing with balsa center section
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WAKEFIELD . . . MASSACHUSETTS

monthly contest, directed by Willard C. Strange and Buren Spawr.

A group of members of the Oklahoma City Gas Model Association, with their machines, is shown in picture No. 9. This is the only NAA gas model club in Oklahoma. (For shame, Oklahoma!) The club is nine months old and boasts of 42 members. Mr. Carl Huddleston is president; Robert Barlow, vice-president and Raymond Bean, secretary-treasurer. Mr. Bean writes:

"We have received permission from N.A.A. to hold our first annual gas model contest here on June 9th and extend an invitation to all N.A.A. members to compete with us for the $250 in cash prizes to be given in the three classifications. There will also be prizes for the Ladies and Appearance Events."

Corning, N.Y.

We hear from Cleon R. Newman of the Corning Aero Club of 28 E. Pulteney Street, Corning, N.Y., who says:

"In the April issue of the M. A. N. there was an account of a wing that caught a thermal and flew away. I hereby wish to go on record and say that I will believe any such story after what happened at a Syracuse meet last year.

"Our club straggled into the Syracuse field throughout the morning and having our planes set up and in working order, walked around, looking at the other models. The day was a model builder's dream, not much wind and plenty of thermals. By the way, this was the day that Dan Veronica set the I.G.M.A.A. record. Well, along about noon another fellow and myself were walking down the line inspecting the various models when there was a commotion over where our gas jobs were left. We turned just in time to see hats, papers and half of a model's wing go swirling up into the air. Then the models that were laying on the ground about us began to teeter and buck, so we grabbed two gas models to keep them from blowing over, but two others took off unassisted and were lifted into the air by the intense thermal accompanied by an assortment of tails, wings and papers. One returned to the field but the other disappeared."

I.G.M.A.A. Trophy

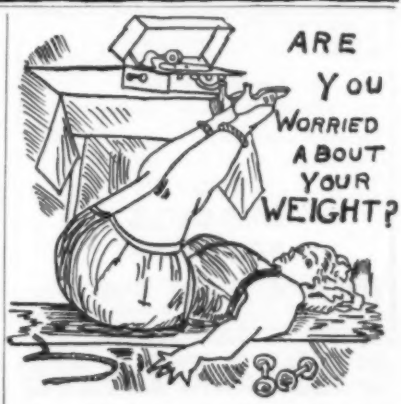
Academy of Model Aeronautics members should not forget that they are eligible to receive the I.G.M.A.A. Trophy for having made an official flight greater than 45 minutes, 35 seconds. This trophy goes to the Academy member credited with the longest official duration flight. At present it is held by Dan Veronica, 153 Riverdale Avenue, Buffalo, N. Y.

Questions

George Krueger of 3823 47th Street N.E., Seattle, Washington, has a few questions pertaining to gas models, the answers to which may assist other builders. He asks:

Question: What is the advantage, if any, of a wing tapered in thickness?

Answer: Such a wing reduces tip loss and prevents stalling of the wing tips. It has the same effect as "wash out" in this respect and thereby increases the wing efficiency.



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18" Wing Spread

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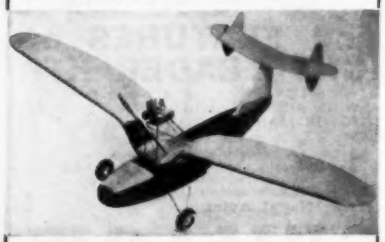
Messerschmitt	1.00
Gloster Gauntlet	1.35
Curtiss Hawk 75A	1.35
Bell Airacobra	1.25
Grumman XF3F-2	1.35
Full size solid plans	25c each
Full size Seagull plans	50c set



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The Crawford Radio

King Wm. & Hughson — Hamilton, Ont.

Question: For best results what should the ratio be between the tail moment arm and the nose length?

Answer: The nose moment arm should be as small as possible relative to the tail moment arm. In other words, the weights of any airplane should be concentrated close to the C.G. This naturally will reduce the length of the nose moment arm. On normal gas models this distance from the center of the wing to the rear vanes of the propeller is about 30% of the tail moment arm length; that is, the distance from the center of the wing to the center of the stabilizer. This varies within certain limits and certain models from ¼ of the moment arm to ⅓ the moment arm.

Question: What is the advantage of a long moment arm or of a short arm moment arm?

Answer: The advantages of a long moment arm are: increased tail surface effect which produces greater steadiness of flight and less unnecessary length of the plane; also more positive correction of disturbing forces which tend to turn the plane from its normal flight course. On the other hand, the short moment arm has the advantage of reducing the weight of the airplane.

Question: Approximately where should the step of a float be located in relation to the C.G. on a flying boat model?

Answer: The step should be located approximately under the C.G. or very slightly to the rear of it.

Cleveland, O.

The Cleveland Balsa Butchers cooperated with the Cleveland Press Junior Aviators in sponsoring an exhibit at the recent Sportsmen's Show in Cleveland's huge public hall. More than 500 models were entered in the show's contest, conducted by "The Press" in cooperation with the Cleveland Women's Chapter of the National Aeronautic Association, and the final 60 winners were a part of the display along with trophies and prize ships of the Balsa Butchers.

Nashua, N.H.

"The Nashua Cloud Chasers, a gas model club, was organized a year ago and boasts of a membership of thirty-five. We have been quite active and have taken part in a number of contests.

"On November 12, 1939, we sponsored an Inter-State Gas Meet at the Nashua Airport, with the permission of the airport manager and everything was run off very smoothly. There were forty-five entrants and Irving Day of Salem, Mass., won first prize—a Brown Junior Motor, His total time was four minutes and twenty-seven seconds. Richard Simses of Nashua won the Club Trophy for the longest single flight of two minutes and thirty-four seconds. This contest was such a success that we have made plans for an even bigger and better contest to be held June 30, 1940, at the Nashua airport. We hope to have many of the New England clubs attend and compete for the many grand prizes.

"The club is at the present time building a radio controlled ship which will be powered by a Forster. Mr. Robert Slavin and Mr. Mooney, both excellent radio men, are building the radio parts.

"We hold a contest each month for members at the local airport and two trophies donated by local merchants are awarded to the person attaining the greatest time flight. These trophies, one for large bore and the other for small bore are held each month by the winner and awarded at the end of the year to the one having won it the greatest number of times.

"We are fortunate enough in having a small club room in which members may work and get together to discuss model building."

Denise Lucier, secretary of the Cloud Chasers of Nashua, N. H., has been kind enough to send the above report of his club's activities.

Omaha, Neb.

The first annual "World-Herald" sponsored model airplane building contest closed successfully with the award of prizes to 41 of the more than 250 entries.

Edward Rich, 1312 South Fifty-fifth street, won first prize—a medal and a gas model plane motor—in the senior gas model division. His gray and red pusher-type plane with 11-foot wingspread was placed at the head of the table of gas models and attracted considerable attention during the day.

Among the gas models of the senior division was a radio controlled plane, entered by Bob Manoli of 3904 North Seventeenth street. It won honorable mention.

First place in the junior division of the gas model planes was won by John Wilkening of Blair, Neb., with a yellow and purple low-winged monoplane with semi-cantilever wings.

Philadelphia, Pa.

Recently the Quaker City Gas Model Airplane Association put a special exhibit in a Hobby Show held at the Henry H. Houston 2nd, Post No. 3 of the American Legion, of this city. The show itself was excellent.

The highlight of the exhibit was a 13 foot Douglas transport built by Charles Gutekunst. The ship weighs 13 pounds and is powered by two Browns. It has never been flown because of the difficulty in synchronizing the two motors. The ship has a very flat glide.

Simpsonville, S.C.

We hear from Simpsonville, S.C., as Charles Folk writes:

"As secretary of the Simpsonville Thermal Chasers, I would like to let you know something of this recently-organized gas

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Size 1¾"—PRICE $0.60 PER PAIR, POSTPAID. For Air Mail Add 11c.

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Horsepower	1/8
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Flying weight—coil, condenser	11½ oz.
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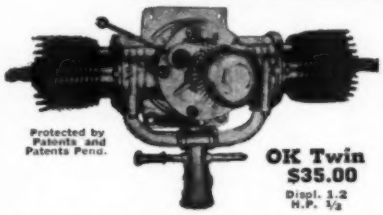

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Model	Displacement	Price
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49	$15.00
Special	15.00
Standard	18.00
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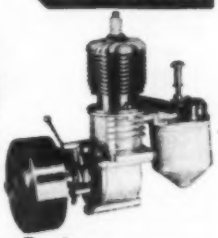

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model club.

"Gas modeling in its infancy here, started about a year ago when I built the first gas job in Simpsonville. We now have seven gas modelers, have built over thirteen jobs and have organized the Thermal Chasers. This may seem to be a small number for a club but since there are only 2,500 people in this town we are proud of this number. Many towns of 60,000 and over have gas model club with only a few members such as twelve or thirteen. It looks as if these clubs could create interest enough to grow in places of this size. We have influenced boys in other towns and started them on their way toward gas model building. When the flying season starts we hope to find a few more boys here to start building models and help them get a good start.

"Last Tuesday we had our first real snow in quite a few years. Not willing to lose any flying time we equipped one of our planes with skiis and using a smooth running, easy starting engine we tried snowflying for the first time. The first flight was not successful as the boy launching it did not push or shove it, depending on the motor to get it off. It traveled about one hundred yards without lifting before jumping a ditch into a brush pile. Better luck prevailed on the next flight and the ship got off to a slow but steady climb after a run of only three yards. One more flight was completed, then the motor refused to run, as motors have a habit of doing in this cold weather and when a crowd gathers to watch the fireworks. The only noticeable difference in flight with skiis was in the climb, the weight of the heavy skiis cutting the rate of climb considerably.

"Not only has the club caused interest in town but at school also. An Aviation Club was organized at school in November and holds meetings once a week.

"Northdale Model Airplane Flying Field is now known to a great many flyers but there are a very great number who do not know about it and would be very glad to know that Northdale is available for their use.

"It is the purpose of our organization to maintain and promote interest in gas model aircraft and to accomplish this purpose we do not limit membership to owners of gas models. Any one who is interested in this fascinating hobby is eligible for membership in our club.

"Our contemplated program includes the lease and maintenance of our own flying field, N.A.A. affiliation and inter-club and intra-club contests. At the present time we are negotiating with one of the largest fraternal and social organizations in this city to act in the capacity of sponsors."

Alliance, O.

Lyle Crist of 611 South Union Ave., Alliance, Ohio, writes:

"Here in the city of Alliance a group of approximately twenty-two boys have organized a model airplane club to be known as the Fying Screwballs. This club has established headquarters in the Carnegie Library, South Arch Avenue, this city.

"The club has adopted a set of by-laws and a constitution. These by-laws call for meetings to be held on the first and third Mondays of each month and an entrance fee

MODEL SPIRAL STABILITY

The Model Engineering Company takes pleasure in announcing the publication of Technical Report No. 1 entitled "Model Spiral Stability." This report makes available for the first time a complete and logical explanation of the stability of a model plane. The report shows how to make simple detailed design calculations for model stability conditions and also gives conclusions which may be used by the designers who are not mathematically inclined. In addition to the information given on model stability the report also contains much valuable information on model performance which has not been made available previously. Such subjects as propeller efficiency, motor performance, motor-propeller performance, rate of climb, air speed, wind speed, duration, maximum altitude, etc., are discussed in considerable detail. This report consists of 78 pages 11"x8½" mimeographed. Price 75c postpaid in the U. S.

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The Super Streamlined TIGER SHARK, "G" Line Speed Plane, roars through the air at the unbelievable speed of from 50 to 75 M.P.H. Due to the inherent "G" Line Flying Stability, engineered into this design, the Shark is unusually stable and easy to control. May be powered with any 1/7 or 1/5 H.P. Motor.

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CAROLINA MODEL SUPPLIES
206 BROAD BENNETTSVILLE, S.C.

of 50c with monthly dues of 25c.

"While the club is new many boys in town have already shown an increased interest in model building. The club plans to purchase the club insignia in decal form for use of its members. We boast of many excellent modelers in all fields of activity. Already we have one radio job and expect to have another one soon. Our activities will include contests throughout the spring, summer and autumn months."

Minneapolis, Minn.

Richard Billett of 2548 Nicollet Avenue, Minneapolis, Minn., writes a few words of activities in this section of the country. He says:

"In the line of news I might pass on that the Minneapolis Model Aero Club at its last meeting had an election of officers and our new president is F. H. Beaupre, one of the older heads whom we feel will really make things hum up here. V.-P. is Hal Jeppeson; Sec., John Cleveland; Cor. Sec., Geo. Johnson and Treas., Fred Emmert. Directors are Lief Erickson, Bob Apgar, Bob Toft and Richard Billett.

The date was set for the annual spring contest, June 16th. Location to be announced. A, B and C Class gas divisions and rubber. Most lucrative award will undoubtedly again be an all-expense trip to the Nationals.

"Arrangements are being made (rather they are practically completed) for regular once-a-week permission to use our splendid armory for indoor flying. Believe this will revive a practically lost art in this section and you can look for records to be made here in Minneapolis with the indoor jobs. Aforesaid arrangement may also pave the way for getting the same location for miniature midget racer racing."

Air Ways

(Continued from page 25)

Picture No. 1 shows a scale model of the Vought V-143-A, built by Merlin Dull of 36 Adams Street, Tiffin, Ohio. It required 400 hours to complete and embodies features such as a retractable landing gear, sliding hatch, built-up motor of about 250 pieces, controllable pitch prop, cowl ventilator, seat with safety strap, joy stick, rudder pedal, radio, dashboard, throttle, gunsight, machine gun, radio antenna and pilot tube. Having completed such a model, its builder cannot help but thoroughly understand design and structural features of the large plane; and such information gained by model builders is never wasted.

Another fine piece of scale model work is shown in picture No. 2. This is a Douglas DC-2 constructed by Leland Ruffner of 225 Vine Street, West Lafayette, Indiana. It has a span of 43 inches and, as you can see in the picture, details have been worked out carefully and include movable controls in the cockpit, retractable landing gear, all interior details including stewardess' compartment, lavatory, mail, baggage and radio rooms. There are six electric lights; navigation, landing and cabin. Another noteworthy feature of this model is that it is entirely metal covered and required 400 hours to construct. Even the cowls are removable and the engines are built in complete detail, including carburetors, magnetoes, etc.

Picture No. 3 might easily be mistaken for one of a large ship taking off from some airport. However it is only one of a Howard scale model, built by Stanley Sears of Parks Air College, East St. Louis, Illinois. Sears does not give much information concerning the model's construction, except that it has been carefully planked with balsa. It is a most realistic piece of work.

Now we come to a man of action—Allan Schultman of St. Lukes-in-the-Desert, Tucson, Arizona—who believes in making models for flying as well as looks. He sends us picture No. 4 which shows his flying scale GeeBee. He says this ship is the result of the secret admiration that he has had for the GeeBee monoplane which was flown in the Air Races of 1934 by the late Lowel Boyles. He continues:

"At that time I watched his red and white ship kick around the sky just off the shores of Lake Michigan from the Grant Park site. I happened to be fishing at the time and was attracted by a faint hum that soon became a roar. The red and white monoplane was racing in my direction, very close to the water and traveling like a rocket. Just as he passed overhead he pulled back on the stick and climbed vertically for a mile or more. I never forgot this thrill, which eventually was responsible for the building of this little model."

The ship has a span of 25 inches and has turned in some very fast flights. Schultman makes a comment, the answer of which may be of help to many other builders. He says:

"I notice that so many gas models have a tendency to glide earthward rather sharply. Could this be corrected by a device increasing the angle of attack at the moment the motor shuts off?"

The answer to this is that it could be, but it is not necessary to do this. If the model is properly designed it can be made to glide gently. When the above occurs it means the tail surfaces are too small, the center of gravity too far forward and possibly too much difference in angle between the wing and the tail. To produce a flat glide, make the area of the stabilizer 1/3 of the wing area, set it at approximately half a degree positive and incorporate a difference in angle between the stabilizer and the wing of not over 2 1/2 degrees. Under these conditions the center of gravity will be from 40 to 50% of the chord back from the trailing edge. The area and setting of

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The Gamma performs equally well in Class A or B. Kit contains finished prop, air wheels, colored dopes, cement—Everything needed to build a complete plane—span of 45", easily constructed fuselage of strut and longeron type, shock absorbent landing gear with Trexler Air Wheels.

Air Wheels
VMS Prop
Colored
Dopes

DEALERS WRITE

Ohlsson "19" $14.50—Ohlsson "23" $16.50. Hi Speed $12.75. Write for trade-in allowance. All motors in stock.

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the tail is responsible for the rearward position of the center of gravity, which position in turn tends to make the model nose up when gliding. Thus a flat, long glide will be the result.

Picture No. 5 shows Kiely Primaris of 355 Mohawk Avenue, Scotia, New York, who won the championship of the Schenectady Aeroneers for 1939 and the club trophy. He captured this by making the longest flight of any member of club, 12 minutes out-of-sight. His plane was a replica of Alvie Dague's championship stick model. We are indebted to John Scherer for this picture.

A great deal may be learned concerning the structure of large planes by making scale models with great structural details. Picture No. 6 shows a Curtiss 3-C Hawk of this type, built by "One of the Flying Crackpots." This is the only name this young model builder signs to his letter so we will have to let it go at that. Your guess as to his identity is as good as anyone's. Surely such a fine piece of work is deserving of a better name than this. The model is built to a scale of one inch to the foot and embodies a retractable landing gear which works "like the real thing" with the exception that it cannot be controlled from the cockpit. Otherwise, all cockpit details are included. The framework is made from tin instead of aluminum inasmuch as it was easier to solder. It is metal construction throughout.

CLUBS

New York City

One of the active clubs formed recently is the Franklin Simon Airplane Club. Some of its members are shown in picture No. 7 with their director, Mr. Harold Kulick, who is at the left of the lower row. They have been holding an airplane building contest and flights will take place on May 15th at Van Cortlandt Park, New York City. Planes will be judged on the basis of design, craftsmanship, knowledge of engineering principles displayed in their construction, and airworthiness. This club has now started on its second year and boasts an enrollment of 165 boys between the ages of 9 and 16. They are divided into three groups: Beginners, Junior and Senior.

This club meets every Saturday morning in a specially equipped workroom on the eighth floor of Franklin Simon's, where the work of constructing model airplanes, the study of aerodynamics and airplane construction are carried on—under the supervision of an instructor. Motion pictures of a technical nature, lectures by celebrated airmen and airplane designers and the publishing of a newspaper are all features of the weekly schedule.

A committee of prominent airmen and editors of aviation publications is being formed to judge the airplane building contest. Prizes will consist of gas engines, gas model airplanes, rubber powered airplanes and work kits.

Philadelphia

William H. Lukens of 5507 Boyer Street, Philadelphia, publicity manager of the Quaker City Gas Model Airplane Association, apparently is also interested in rubber models, for he says:

In Philadelphia rubber models are staging a comeback. The various units through-

The **GAS MODEL** *everyone is* **WAITING FOR!**

COMET

COMET *will announce* **CARL GOLDBERG'S** *latest and greatest achievement in this magazine* **NEXT MONTH!**

COMET

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You've missed our ads and here's why. Our initial announcement of the sensational little "Madewell Motor" literally swamped the factory. And we've been swamped until right now. Finally, we've caught up and can now fill your orders promptly.

"Plenty powerful," "A swell job," "Got 'em all beat," "Never saw anything like it," that's what they're saying everywhere.

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Now packed in attractive display box (propeller not included).

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"Silkspan's" superior features of strength and ease of application recommend it above other covering material for contestants in this year's nationals.

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36" Gas Model GA1...65c postpaid
(NO LIQUIDS, NO MOTOR)
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MEGOW'S

46" Class "A" Soaring Eagle Gas Model..... $2.95 postpaid
50" Rearwin Speedster ..... $1.10 postpaid
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50" Aeronca "K" ... $1.10 postpaid
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out the city are adding rubber model activities along with the gas model work. Roxburough and Germantown units are leading the drive to organize outdoor rubber models, so that we may cooperate with the Philadelphia Model Airplane Association by taking up outdoor flying when their indoor season ends."

Elm Grove

John Harrington, of 111 Key Avenue, Elm Grove, West Virginia, sends a report concerning his club. He does not give its name other than T.M.C.—so we will let you guess what it is. He says:

"The second club indoor meet was held in the high school auditorium. The chief purpose of this competition was to break Dick Everett's high school record of 2:12. The final checkup tells the following:

"1. George Friebertshauser (high—2:29.5, average of 2:23.43 mike-covered Baby R.O.G.)

"2. John Harrington (high—2:19.4, average of 2:07.33 mike-covered Baby R. O. G.)

"3. Allen Goodwin, 18 seconds.

"4. Basil Graham, 10 seconds.

"Meanwhile a model demonstration was given by yours sincerely at two of our home basketball games played in the Elm Grove Junior High gymnasium. Everybody got a thrill watching the crate perform (class 'B' indoor stick-(mike) of W. Simmers' design) and play with the rafters.

"Later we obtained permission from the Board of Education to conduct meets every Saturday afternoon from 2 till 5.

"All indoor 'whittlers' of Wheeling are invited and may fly at any of these gatherings as guests of the club. Maximum altitude of the E. G. Jr. gym is only 25 feet, so you see we have a limit which we try to approach. Mr. Everett got around 7 minutes with a stick several years ago. He is now associated with NACA of Virginia.

"Our first meet was held last Saturday afternoon. Prizes are not being given because we consider ourselves 'lucky' if we have six contestants. Results were:

"1. John Harrington: 4:11.8 class "B" mike stick. Former High was recorded at the Pittsburgh indoor championships held last March 12, 1939. Time was 3:29 with a paper-covered stick of the same design.

"2. George Friebertshauser: 2:33.8 Class 'A' mike R.O.G. Former High was recorded at the second indoor meet held in the high school auditorium. Time was 2:29.5.

"3. Dale Richman: 18 seconds. Richman flew two paper covered R.O.G.'s."

Flushing

We have an interesting note from Ronald J. Ross of 132-24 Maple Avenue, Flushing, New York. He tells us that:

"On Saturday, January 6, 1940, the Flushing Aero Modelers began the new year by being host to Ed Soltis of the Mount Vernon Model Club.

"After several weeks of corresponding with Alfred Young, chairman of the F. A. M., the club invited him to come to their rooms and meet the members of the club. Mr. Young, with Herbert Willson and Ronald Ross, met Ed at the railroad station in Flushing and escorted him to the club rooms at 42-37 Union Street, Flushing.

"He brought several hundred *swell* snapshots of his ships, both still and in action. He also brought two, two-hundred foot reels of moving pictures his brother took of him flying his ships. Seeing them made us all wish we had a movie camera and could take such dandy shots.

"Ed is a deaf mute and we had to converse with him by signs and writing. Although he has this handicap of deafness, he can do just as much and even more than the average model builder.

"In speaking for the club I can easily say we will not soon forget Ed's visit and look forward to a future visit."

Pittsburgh

Harry J. Vogler, Jr., N.A.A. Contest Director, recently held a scale model contest in his district, which was won by Walter Stevick with a beautiful scale Bell P-39 in which the cabin was illuminated with tiny bulbs. He won the MODEL AIRPLANE NEWS Trophy especially donated for this event.

Urbana

Mr. Joseph C. Thompson of 1103 W. Illinois Street, Urbana, Illinois, writes and informs us that a model airplane club has been formed at the University of Illinois, under the auspices of the University's Y.M.C.A. A workshop has been set up in a basement room which is reserved for the exclusive use of the model builders, a group numbering seventeen. He continues:

"Officers elected for this year are President, Joseph C. Thompson, prominent designer and builder of Chicago; Syd Hettinger, Vice-president; and Forrest Honderich, secretary-treasurer. The adviser is Lloyd Richey, engineering drawing instructor.

"Membership is composed of members enrolled at the University. A contest is to be held early in May, the tentative date being set as May 5th. All are invited. Contest inquiries should be sent to Forrest Honderich, secretary, c/o University Y. M. C. A., Champaign, Illinois.

"The members build models in their spare time and each either has or is building a gas model. However, rubber models are also built.

"We are extremely fortunate to have Bill Good, co-holder of the national radio-controlled gas model title, as a club member."

Newark

On March 9th the Kresge Aero Club of Newark, New Jersey, held its annual Indoor Championship Meet at one of the armories in this city. One of the unnecessary features of the contest was the hanging lights which managed to snare many of the ships and hold them in suspended animation. Among the many radical types of indoor gliders shown was one with an aspect ratio wing of less than two, used by Roger Hammer and Gordon Murray. Strange to say, nearly every one of these unusual designs really won prizes.

The Senior Glider Event was won by Edward Lifante with 33.5 seconds average. Second place was taken by Roger Hammer with 33 sec. average. In the Junior Glider Event John Powell won with 27 sec., and Martin Ryan was second with 25.5 sec.

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1/16 sq. 60, 5c
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18" Balsa Sheets
1/64x2 6 for 10c
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3" & 36" cost twice 18"; 3x36, 3 times.

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1/8x3/16...12 20c
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Sheets, 4 times 18". Double the above price for genuine aircraft SPRUCE.

18" Balsa Planks
1/2x1/2...2 for 5c
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2x3...1 for 22c
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Plastic Balsa
4 oz. 23c, 1 oz. 10c

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1/2x3x5 7—5c
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1x11/2x15 6c ea.

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No Premiums or Packing Charge on Motors. P.P. 15c.
Ohlsson "19" ...$14.50
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Big Allowance For Old Motors

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CLEAR DOPE THINNER
Banana Oil
1 oz. 5c, 1/2 pt. 30c
2 oz. 9c, pint 50c
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1 oz. 6c, 2 oz. 11c
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MICROFILM RUBBER LUBE
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1 oz. 9c, 2 oz. 15c

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H'vy qual. 45c yd.
AA TISSUE
All col., doz. 10c
Silver.....ea. 4c
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Per pair—P.P. 1¼, 1½—40c
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Gas Mod. 2¾—$1
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Per pair—P.P.
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5- 4c- 7 Mod.
6- 5c- 9- 8-40c
7- 6c-12- 9-40c
8- 7c-15-10-40c
9- 8c-19-11-40c
10- 9c-23-12-50c
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Terminal Clips 5/8" 10c val. 4— 5c
Gas Funnel, Alum. strainer....25c
Spaghetti Tubing 1 1/8" 3 ft.—10c
Toggle Switch 50c val. 39c
S.A.E. 70 Oil—2 oz. 15c 1/2 pt.—30c
12" High Tension Leads—Best....14c
Booster Leads—50c Val. 35c
Masking tape—1/4x36-Instruc. card 5c
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Small 59c
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1" DeNut 10c
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Per foot
1/16 ....6c... 8c
3/32, 1/8 ....7c...10c
3/16 1/4 ....9c...12c
Sheet Alum.—ft.
.003 10c .010 15c
ALUM. LEAF
3 sheets.....5c
Dural Angle
1/2x1/2 .....15c ft.
3/4x3/4 .....22c ft.
BOMBS
3/4" .....2 for 5c
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Model Knife, Surgical Steel Blade 10c
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Washers, pinhole, 1/8, 1/4, 2 doz. 3c
Prop Shafts, doz sm. 6c, large....10c
Ball Bear; 1/16 15c ea., 1/8.....33c
Nose Plugs for 8c; 1/2"—8, 3/4"—6, 1" 4.

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1/16" 3 ft. 5c
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1 .03 .05 .07 .06
1 1/2 .04 .07 .10 .09
1 3/4 .06 .10 .16 .12
2 1/2 .12
3 .15 .30

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1/16 sq. 15 ft. 5c
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Skein 225 ft. 1/16 35c, 1/8 60c, 3/16—85c

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Med. 5c, Lge. 8c
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1/2 doz., Sm. 5c
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1 1/2" 8c, 2" 12c
2 1/2" 14c, 3" 17c
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3/8" 2c, 1 1/4" 4c
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The Senior Stick Event was won by Henry Struck with 9 minutes, 46 seconds. Frank Haynes placed second with 9 min., 31 sec. Julius Rudy won the Junior Stick Event with 5 min., 39 sec., and Edward Tiefeld was second with 4 min., 35 sec.

Air Youth

Air Youth of America is planning to hold state contests throughout the country from which winners will be selected to fly at the Nationals. Details concerning this, as yet, haven't been decided upon; however, Air Youth enthusiasts may look forward to some interesting events.

National Aero Reserve

Lt. John L. Scherer, Director of the National Aero Reserves, informs us that this organization will conduct state contests during July and August in Rochester, Albany and Utica, N.Y., and Hartford, Conn. Exact dates have not been set as yet, but interested model builders living in these cities may secure latest information by writing to the Young Aviator Editor of the Gannett newspaper published in these cities.

Gold, silver and bronze medals will be awarded, as well as valuable merchandise prizes. The city champions will be eligible for competition in a Grand Contest in September. Last year's Grand Contest winners were flown to the National Air Races in Cleveland in the Gannett Newspapers' Lockheed-12 airplane of which Mr. Scherer is co-pilot.

Paris

Mr. George Calvin Schriner of Paris, Arkansas, writes that the Junior Aviators of Paris has been recently organized, of which he is Wing Commander. The Assistant Wing Commander is Leon Blattler. The Club at present has 26 members and is planning to hold a model contest in the near future.

Finishing Models

Mr. John Duke of 105 Prospect Street, Northampton, Mass., writes and wishes to know how he can finish his model. He wishes the finish to be smooth and glossy, yet light. Here is a hint which will help him and others who are faced with this problem:

The part to be finished should be thoroughly sanded, then coated either with a brush or by dipping, with a thin, hot solution of granular fish-glue. This glue looks very much like coarse brown sugar and may be purchased at a hardware store. It should be boiled in water so that its consistency is just a little lighter than 3-in-1 oil. After it has been applied hot, the parts should be left to stand or hung in a position so that the glue drains off. When the glue is dry to a brittle hardness, the surface should be very lightly sanded with very fine sandpaper. The object is to smooth the glue surfaces without removing the glue to any extent. After the smoothing process, apply enamel or Duco as you would to any ordinary surface. The glue will prevent this finish from sinking into the wood and it should be extremely light and glossy. This type of finish adds less weight than any other finish we know of.

Models for Money

I. Mari Rickel of 3127 SW 21 Street, Miami, Florida, sends us a note of an interesting incident which took place recently in her home town:

Johnny Fine went home one evening after school and secured some bright red paper. He cut out letters to spell "Mile of Dimes," which was a drive to secure money for milk to give underprivileged children. Then Johnny secured two pieces of string, tying the ends to his plane and fastening one string to the top of each letter and the other to the bottom. After he had done this he tied the two pieces securely to the last letter, thus finishing his streamer. Next addition to this list of material was two firecrackers, which had been left over from the Fourth of July.

His plane all ready to go, Johnny got his bicycle and rode down to the newspaper office where the six-weeks drive was about to start. Johnny asked permission to inaugurate the drive, which was granted. He started his gas engine, lit the firecrackers that were tied to the ends of the streamer and sent his plane into the air with a double bang that caused everybody to look. When they looked up and saw this tiny midget taking to the air with a streamer on the back reading "Mile of Dimes" everyone laughed wholeheartedly. By this time

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the drive had started, with everybody on the street reaching into his pocket. The day's profits was five hundred dollars!

Johnny's picture was put in the paper with the result that soon after, model planes were in demand by many merchants for advertising purposes.

COMING EVENTS

Mr. Harry G. Vogler, Jr., of 1633 Duffield Street, Pittsburgh 6, Pa., sends us a schedule of coming events of the Allegheny Mountain Area Conference Model Airplane Builders.

May 19—I.G.M.A.A. Model Airfield. Glider (H.L.), Stick (H.L.), Fuselage (R.O.G.), Gas Endurance.

June 16—I.G.M.A.A. Model Airfield. Stick H.L., Fuselage R.O.G., Gas Endurance.

July 28—I.G.M.A.A. Model Airfield. Stick H.L., Fuselage R.O.G., Gas Endurance, Gas novelty.

August 25—I.G.M.A.A. Model Airfield. Glider T.L., Stick Hand-Launch, Fuselage R.O.G., Gas power endurance.

September 15—Allegheny Mountain Area Model Championships—I.G.M.A.A. Model Airfield. Stick H.L., Fuselage R.O.G., Gas powered endurance.

On Thursday, May 30, the Linden Model Airplane Club will hold their State Championship Rubber Meet. Full details may be obtained by writing this club at the Linden Recreation Commission, Linden, New Jersey. No entries will be accepted on the field after 1 P.M.

The Bowling Green Model Airplane Club has been recently reorganized and is under the leadership of Vern Hayford. On June 23rd a rubber powered fuselage contest will be held, under N.A.A. rules. Details may be obtained from Dick Craft, 204 S. Church Street, Bowling Green, Ohio.

New York State Exchange Clubs' fourth annual Invitation Meet will be held Sunday, June 9th, at Canandaigua, N.Y., in conjunction with the State Convention of Exchange Clubs. There will be three events: Hand-launched Stick, Fuselage R.O.G., and Gas-Powered. Prizes will consist of trophies, medals and merchandise. The meet is sanctioned by A.A.M.A. and will be directed by Harry C. Copeland of Syracuse, assisted by Stanley Zamory of Sidney and Robert N. McCollom of Binghamton, all of whom are official contest directors and comprise the N. Y. State Exchange Model Aviation Committee.

Entry blanks giving complete information will be available May 1st and may be obtained from Harry C. Copeland, 712 Loew Building, Syracuse, N.Y.

The State Exchange annual meets have been proclaimed to be the outstanding event in the East and Canandaigua Exchange Club, the host of the 1940 meet, extends a warm invitation to all modelers to come to its famous "Finger Lakes" city on June 9th.

The Jersey Airsquires, a gas model airplane club in Jersey City, N.J., will hold its first annual Invitation Gas Powered R.O.W. Seaplane Contest on June 9th. It will be held on the Mettleconk River, Breton Woods, Ocean County, N.J., under

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Wheel Base 12½". Tread 7⅝". Weight ready to run approx. 5 lbs.

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the sponsorship of the Van Ness Corporation. There will be trophies, engines and merchandise awarded. N.A.A. rules will apply and contestants must closely adhere to these rules when flying their ships. All models must take off from a standstill UNASSISTED. An N.A.A. sanction has been granted. For entry blank write Richard McNally, 60 Cambridge Avenue, Jersey City.

The Kresge Aero Club announces its All Eastern Championship Gas Model Contest which will be held at Hadley Field on June 1st. Details may be obtained from Leon Shulman, Kresge Aero Club, Kresge Department Store, Newark, N.J. The events will be: Class A, B and C and Pre-determined Flight. Up to ten prizes will be given away as awards in each event. As a grand prize to the High Point Scorer, a free trip to the Nationals will be awarded as well as being crowned the All Eastern Champion. This meet will be N.A.A. sanctioned.

The Charles City Sky Devils, local model aero club sponsored by the Oliver Athletic Association, are planning a big model meet for gas and rubber contestants to take place in Charles City, Iowa, on May 12. $150 in prizes are being offered. All model builders are urged to write the Oliver Athletic Association, Charles City, Iowa, for more information. The Sky Devils Club has over 20 active members who have been working on models all winter and are turning out some very fine jobs.

The New England State Open Gas Model Championships will be held at the old Saugus Race track (Franklin Park), Saugus, Mass., on May 19th. Rain date is May 26th. The meet will start at 9 A.M. and close at 5 P.M. It will be run according to N.A.A. rules and all models entered must have not less than 10 ounces wing loading; this is the Massachusetts state law. Entry blanks must be posted not later than May 11th. Further details may be obtained from Day's Model Airplane Shop, 119½ North Street, Salem, Mass.

The second annual contest of the Windsor Model Airplane Club will be held in Windsor on July 28th. There will be gas model events in Class A, B and C; a stick event; a best-finish event, and a free-for all for juniors under 15 years old. There is also a cabin and fuselage event under Wakefield rules. The gas models and stick event are run under N.A.A. rules. Winners will be awarded gas motors and cash prizes. Runners-up will receive other valuable prizes and trophies. Write Eddie Lee, The Windsor Model Airplane Club, Y.M.C.A. Building, Windsor, Ontario, Canada, for further data.

The Milwaukee Gas Model Chapter of the N.A.A. will hold an N.A.A. sanctioned meet on June 9th at the Curtiss Wright Airport, Highway 41 and Silver Spring Road, Milwaukee, Wisconsin. Expenses of a trip to the Nationals will be paid by this chapter for the Wisconsin Champion determined at this event. For further details write Edward Tschernoschi, 2451 N. 26th Street, Milwaukee.

Write and send pictures of your activities for publication in Air Ways and Gas Lines.

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36" Span. Length 22". 1" Scale. Weight 2 oz.

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A beautiful exact scale flying model with unusual flying range, so light it will rise from land or water in 6 feet. Const. set contains all parts printed on balsa, carved propeller, hardwood wheels, 2 oz. white dope, ½ oz. black, glue, full sized scale drawing, and all parts to build. Set p.p..... **$1.50**

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NORTHROP A-17 ARMY FIGHTER

24" Span. Length 17". ½" Scale

Set has 7" prop. turned motor front, wooden wheels and complete set of paints. Postpaid..... $2.50

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37" CURTISS P36A	Set	3.25	27" HAWKER HURRICANE	Set	2.50
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3/32x3/32 .....25c
⅛x⅛ 30c
⅛x3/16 .....50c
⅛x¼ 55c
¼x¼ 85c
3/16x3/16 .....50c
3/16x¼ 60c
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BALSA SHEETS
36" Lengths
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2x3, each.....35c

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1 oz. bot. dz. 40c
2 oz. bot. dz. 65c
1 pt. 40c 1 qt. 65c
1 gal. 1.75

CLEAR DOPE
1 oz. .....doz. 38c
2 oz. .....doz. 60c
1 pt. 35c 1 qt. 60c
1 gal. each $1.50
Thinner & Banana Oil same price

COL'RED DOPE
All Colors
1 oz. bot. dz. 50c
2 oz. bot. dz. 75c
1 pt. 45c 1 qt. 70c

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White, doz.....12c
Colored, doz. .14c

BEST BAMBOO
1/16x¼x15 dz. 8c
1/16sq.x12 gr. 10c

MACHINE CUT PROPS. per doz.
5".....20c 6".....21c
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	Birch	Balsa
½"	.03	.09
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¾	.08	.14
1"	.10	.19

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sm. dz. 6c gr. .55
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PARA RUBBER
225 ft. skeins
¼ flat.....40c
3/16 flat.....65c
Per lb.....$1.20

½" NOSE PLUGS
1 doz. 8c 100 30c
Large, per dz. 10c
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⅛ or ¼, 100 5c

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.002 thick, 5" 25c
.005 thick, 5" 50c
.010 thick, 5" 75c

ALUM. TUBING
1/16 O.D., 5" 25c
3/32 O.D., 5" 26c
⅛ O.D., 5" 30c
¼ O.D., 5" 43c

WIRE, per 100 ft. Straight Lengths
No. 6.....18c
No. 8.....23c
No. 12.....37c
No. 14.....30c

BRASS BUSHINGS
1/16 dia., 100 12c
3/32 dia., 100 15c
⅛ dia., 100 18c

SHEET CELLULOID
12½x16, ea. 19c
6x8, doz.....85c

SPRING STEEL WIRE
(In five (5) foot Length)
1/16 dia.....
.25 ft. for .18
3/32 dia.....
.25 ft. for .50
⅛ dia.....
.25 ft. for .85

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4½" pair 1.50
3 pair for 3.90

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1½"-.13"-2⅛"..... .35
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Fundamentals of Model Plane Design

(Continued from page 12)

which will insure the correct stabilizer aspect ratio regardless of the span and chord of the wing.

Make the span of the stabilizer about 0.43 of the wing span. The latter is to be 22 inches, so the stabilizer span should be (0.43 x 22) or 9.46 inches. This is practically 9.5 inches.

Stabilizer Chord

The area and the span of the stabilizer is known, so the chord can be readily determined. Normally the chord can be calculated by dividing the required area by the span. However, the area referred to here is that which exists after the stabilizer has been finally shaped. Usually the tips are rounded for efficiency's sake, so the stabilizer area before the tip corners are cut away must be larger in order to have the final area the proper value.

Usually about 20% of the required area is cut away in this manner. So the area of the rectangular piece of material which is to form the stabilizer should be (20+4) or 24 square inches. The chord is determined by dividing 24 by 9.5. Thus the chord is $\frac{24}{9.5} = 2.53$ or 2-9/16 inches.

Fig. No. 26 shows a plan-view layout of the wing, propeller, stabilizer and the position they should assume relative to one another.

Stabilizer Angle

Longitudinal stability cannot be retained unless the wing and stabilizer are set at different angles relative to each other. The wing should be set at about two degrees to the line of thrust which is the center line of the propeller shaft. This is shown in the preliminary side-view layout of the plane, Fig. No. 27.

The stabilizer should be set at an angle which is two degrees *less* than the wing. Therefore it will be set parallel to the thrust line, at zero degree.

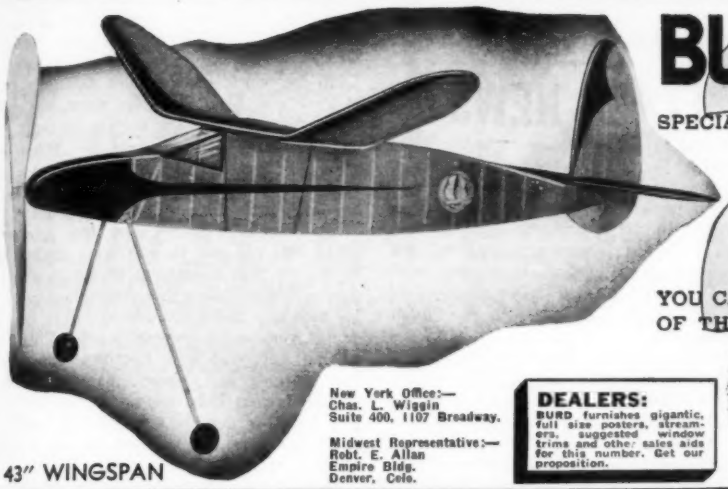
Position of Wing

The position of the wing influences the stability of the plane as well as the size and angle of the stabilizer. The simplest and least involved form of design will be used in this plane as it is being designed as a model builder's first power-plane. Therefore the wing will be placed at that point in a vertical sense which is customary with a normal stabilizer area and angular setting.

Such a point is one in which the wing center section will be slightly below the thrust line. Due to the dihedral of the wing, then, the center of lift, Fig. No. 27, will be slightly above the thrust line.

While working out the aerodynamic characteristics of your model it is wise to make rough sketches of the general layout of the plane and sizes determined from calculation of these factors. These sketches, similar to Figs. No. 26, 27 and 28, will prove helpful in visualizing the character of the plane and in making the final accurate layouts of its structure.

Dick Korda's WORLD RECORD HOLDER



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Fin Moment Arm

The fin controls the model directionally, and its distance from the wing and its size determines its effectiveness in this respect. The next step therefore is to establish the distance of the fin from the wing. This is called the "fin moment arm." The rule is: Make the distance from the center of the wing to the center of the stabilizer equal to one-half the wing span. Thus its moment arm will be the same as the stabilizer moment arm, 11 inches. Therefore it may be placed directly above this latter surface or partly above and partly below it.

Fin Area

The fin must have a certain amount of area or the plane will not fly a straight steady course and will have a decided tendency to spin. Therefore it is a very important part of the plane. A simple and satisfactory rule to follow in nearly all cases is: *Make the fin area equal to 12% of the wing area.* Thus it should be (0.12 x 60) = 7.2 square inches.

Fin Height

The correct fin height in simple models, in which the chord of the fin is the same as the stabilizer, may be found by dividing the wing span by 6.3. Thus we have $\frac{22}{6.3} = 3.48$ inches. The chord is 2.5 inches, the same as the stabilizer chord. Multiplying the chord by the span gives: $3.48 \times 25 = 8.7$ square inches, the area of the rectangular from which the fin may be cut. This area is more than is required by 1.5 square inches. This extra amount of area, however, is that which will be cut away when the tip of the fin is properly rounded. The resulting area will be 7.2 square inches. (See Fig. No. 27.)

Length and Position of Landing Gear

There remains but one more aerodynamic factor to determine, the length and position of the landing gear. It will be of the standard two-wheel type and should be of sufficient length to raise the propeller far enough above the ground, when the plane is at rest, to allow a clearance of one inch between the ground and the tip of the propeller blade at its lowest position.

The propeller is eight inches in diameter, so the length of one blade, from hub to tip, is four inches. One inch of clearance added to this makes the required distance from propeller axis (shaft) to the ground of five inches. This should be the value when the wheels of the plane are resting on the ground and the thrust line is in a horizontal position. It is the normal take-off position of the plane.

The landing gear also should be placed as far forward on the model as possible. It always improves the stability of the plane to put all the necessary weight close to the propeller, for the farther forward the center of gravity is located the more effective the tail surfaces will be. The length of the nose is assumed to be 5.5 inches; however, by placing the landing gear weight at the nose of the plane it may be possible to have the wing in a position forward of the *assumed* center of gravity. This will tend to bring the weights of the plane closer to the center of the wing (or vice versa) and the center of gravity.

Also if the landing gear is well forward it can be made lighter, in order to have the plane balance at the assumed center of gravity, than if the gear is located nearer the center of gravity. In other words, the farther the weight of the landing gear is located from the planned point of balance (the C.G.), the lighter it has to be in order to have the plane balance at this point.

Now all the required values of the aerodynamic factors have been determined and a three-view outline drawing of the plane should be made with the parts laid out in their proper relative positions and according to the sizes determined by the aerodynamic calculations. When finished they should appear as in Fig. 26, 27 and 28.

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You will note that no structural details have been inserted in the drawings, only the aerodynamic layout appears. Next month the former will be considered, designed in detail and the complete plans laid out so you can begin constructing your first model plane.

FLASH NEWS

Captain Frederick Dinsmore, most famed of British Imperial Airways pioneer pilots, who had flown 1,250,000 air-miles without losing a passenger, is dead. Noted chiefly for his herioc act of bringing down the then world's largest commercial plane, the Handley-Page Hannibal, in a tiny field near Tonbridge, England after three of its four motors had failed, he was the victim of pneumonia.

American, Eastern, Pennsylvania, Northwest and Continental Air Lines were recently honored with the presentation of the National Safety Council Award for perfect operations records over a period of years. A total of 81,700,000 air-miles with only two fatal accidents was the record for 1939.

Captain Albert C. Read, famed NC-4 pilot of the first Trans-Atlantic airplane crossing, has been transferred from commander of the aircraft carrier Saratoga to command of Pensacola Air Station. Captain Ralph F. Wood, commander of the carrier Ranger has been assigned to command of Seattle Air Station, formerly Sand Point Naval Air Station.

Los Angeles has increased its efforts for inclusion on the Pacific route of Pan American Airways. Offers of complete airport facilities, hangers, seaplane ramps and five miles of unobstructed take-off and landing water-ways have been made. Main objection by PAA is the 650 extra-miles in the U.S.-Hawaii air distance as compared with Oakland.

American Airlines plan for transcontinental cargo-freight service is definitely underway with the stripping down of a Douglas DC-3 passenger ship. Such planes will be used for the time being until a basically designed cargo ship is available.

Your Model and the Law

(Continued from page 13)

60.964 (e) Notification by the airport manager to all model operators so engaged of the rules as drawn."

As a matter of practice, most airport managers have ruled that only licensed N.A.A. members may fly models from their ports. In doing this, it is unnecessary for the manager to draw up a special set of rules, since the rules set forth in the pledge which each N.A.A. licensee signs cover all the points of this law. And this is what is meant by the "gentlemen's agreement" between the N.A.A. and the Civil Air Authority on the gas model question.

It should be noted that the regulations quoted here do not regulate models as aircraft, but govern their activity at airports, and as a matter connected with the use and control of the airport. The Uniform Aeronautics Act, now in effect in many states, defines "aircraft" in this way: "Any contrivance now known or hereafter invented, used or designed for navigation of, or flight in, the air." At first glance this would seem to make a model airplane an aircraft within the meaning of the statute, and so subject to the laws on aircraft. It is more probable, though, that this definition would be interpreted to refer only to a man-carrying machine, since one could hardly be said to navigate the air with a model. Until the courts have decided this question in some case brought before them, we will not definitely know the answer to it.

The next question would be, What *is* a model airplane? Probably it would be held to be a toy or plaything, and so would not fall within the aeronautics statutes.

Model builders need not feel insulted about this. If gas models were regulated by the aircraft statutes as they now stand, they would probably find themselves carrying two way radio, navigation lights, parachutes, various instruments, a federal license and an Approved Type Certificate, to mention only a few things. (We probably shouldn't even have mentioned the A.T.C. We know a certain modeler who would never have his crate off the ground if one of these were needed!)

One or two exceptions to the licensing laws should be noted. The Massachusetts statute specifically exempts model airplane operators from requiring a federal pilot's license and model planes from requiring a license issued by the Civil Air Authority. It leaves the way open, however, for licensing and control of models by the state authority. The section containing the reference to model licenses reads this way:

"No aircraft shall be operated or navigated within this commonwealth unless such aircraft has an appropriate effective license, permit or certificate, issued by the Department of Commerce of the United States or other proper licensing authority . . . ; provided that this section shall not apply . . . to model aircraft operated in accordance with such regulations as the registrar may prescribe."

Connecticut has also put into effect some special laws governing model airplanes. These regulations, worked out in cooperation with the N.A.A., may be found in MODEL AIRPLANE NEWS for February, 1940 (Page 38).

This brings us down to the matter of contests, and in particular, the question of who is liable in case "something happens" at a contest.

A number of model clubs have found it difficult to obtain a sponsor for contests because prospective sponsors are afraid they will find themselves tangled up in a nasty lawsuit or taking a vacation in "Ye Jugge" if an accident should happen.

There are, of course, no specific laws on model airplane contests, and unfortunately—or rather, fortunately—there are no decisions reported on cases involving model plane accidents. But by looking over the laws on similar situations we can get some idea as to the legal rights and duties of the various parties to a model airplane contest.

Next to your motor, the biggest worry at a model meet is the spectators. The law makes some distinction between paying and nonpaying spectators. Nonpaying spectators are known as *licensees*, and are defined as "persons coming on land with the owner's or possessor's permission, but for their own benefit." *Invites* are "persons coming on to

premises for the mutual business benefit of the parties, and at the invitation, express or implied, of the possessor."

The possessor of land owes a duty toward licensees with respect to their safety, but this duty does not include the ordinary risks incident to the condition of the premises. That is an elaborate way of saying that the possessors of land—the contest committee and sponsors who have taken over the airport for the day—are responsible for the safety of those who have been invited to come on to the airport, but their responsibility does not extend to any risks which are perfectly evident to the spectators. For example, if there is a defect in a driveway over which someone stumbles, there is no liability, providing the defect could be seen by anyone taking reasonable care.

But the possessor of land must give a warning, reasonably calculated to reach the licensee, of any hidden or concealed peril to life or limb. Thus, if the defect in paving had not been an evident one—a loose block, for example—then it ought to have been roped off or a sign put up—anything which will reasonably warn the licensee.

The law also says that unreasonable risks incident to the possessor's activities are within the possessor's duty. In other words, the fact that the spectator did not pay admission is no reason why anyone can launch a model straight at him.

Towards invitees—paying spectators—the possessor owes the duty of reasonable care to protect them not only against risks created by his activities conducted upon the land, but also against hazards incident to the condition of the premises. He must not permit the premises to fall into disrepair so as to subject invitees to unreasonable risks. If necessary, he must inspect and warn them, or remove the hazards.

The question is often asked: Suppose we put up a sign, *Enter at your own risk* or *Not responsible for injury or damage done by models.* Will that absolve us from responsibility in case something happens?

Unfortunately, it will not.

You cannot escape liability to someone injured through your negligence, simply by saying you will not be liable. This might be a little hard to see at first, but just think about what could happen if the law were the other way.

The points that have been made here are well illustrated in the case of Wells vs. Minneapolis Baseball and Athletic Assn. (122 Minn. 327, 142 N.W. 706, 46 L.R.A. (N.S.) 606, Am. Cas. 1914D, 922).

The plaintiff in that case, a woman, attended a baseball game on "ladies' day," and was admitted free. A portion of the grandstand was screened from the field, the rest unscreened. She seems to have sat in the unscreened part and was struck by a batted ball, receiving an injury for which she sued the athletic association, on the grounds that they were negligent in not taking measures to protect those spectators sitting in the unscreened part of the stand. The ball club had put up large signs in various parts of the grandstand saying *The management will not be responsible for injuries received from thrown or batted balls.*

The court held that if the plaintiff clearly knew the dangers of taking a seat in the open, she assumed all risk of injury from the balls. It was said that the jury might find that these signs informed her of this risk, warning her that there was an actual danger from batted balls which she might not otherwise have realized. In this respect the court said: "Conceding that the defendant may not escape liability by merely stating it will not be responsible, nevertheless we do think that the signs convey information that injuries are apt to happen from thrown and batted balls, and are therefore in the nature of a precaution to prevent injury."

Applying this law now to the situation of a model airplane contest, certain facts become quite clear. Merely putting up a *Not responsible for injuries* sign will not release the contestant, the committee, or the sponsor—as the case may be—if someone should be injured through their negligence.

But if the injured party received his hurt because of some carelessness of his own, or partly because of it, such a sign might be found to have been a warning which should have placed him on his guard, so that he cannot say that he was entirely ignorant of the dangers of the place. You see, the law is always easier on you if you can prove that the injured party was partly to blame too.

Such a sign also tends to discourage unfounded claims for damages. Its use, therefore, need not be abandoned, so long as its limitations are clearly realized.

This brings us to the question of just who is liable in case of an accident at a model airplane contest.

This is a hard one to answer, but in general it is the person whose negligence

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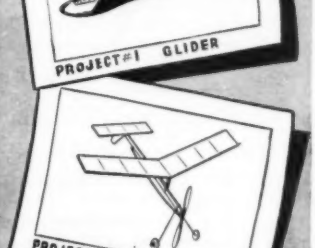

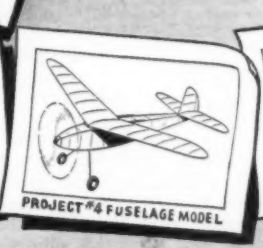

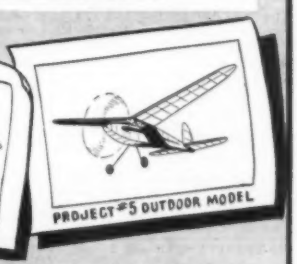

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Memo to all Hobby Dealers

Be sure and read the important announcement on page 38. It's a sales tip that should be heeded!

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or carelessness caused the damage. If the contestant was careless about the way he flew his model—and especially if he disregarded the instructions of the contest director—then it is probable that the contestant will be liable.

If the contest director or the sponsor was careless in making arrangements, so that an accident resulted, then it may be the contest director or sponsor who would be liable.

A point to which particular care ought to be given is the making of test flights during the time that official flights are being taken. The contest director ought to exercise some care in seeing to it that test flights are made well away from any point where the model might cause damage, and he ought to insist that flights be made as directed, and nowhere else.

Rather than worry about the question of who is liable in case of an accident, it would seem much wiser to think about how to prevent accidents. The law is very reasonable, and nobody is ever made to pay for something that is absolutely not his fault. Thus, the whole law on the subject of contests could be summed up in just two words: BE CAREFUL!

Next month we will consider some more of the legal aspects of model aviation, including the matter of that plane "in hock" that we started out with. In the meantime, we hope it's not your model that's being held for ransom.

The Army's Flying Umbrella

(Continued from page 31)

cal take-off. She climbed straight up at an angle that would have stalled any other ship. There was seemingly no speed at all, but experts estimated it at 60-75 m.p.h.

"Well, do you believe it now?" remarked T. Claude Ryan, president of the company which built the craft. "It actually amazed us as much as it has you. We had to see it twice ourselves before we'd believe its designer's predictions."

Ryan, his chief designer, Millard Boyd, who designed the "Flying Umbrella" along with a Ryan test pilot, were at Wright Field the day Maj. Umstead brought the plane there.

Millard Boyd cast an interesting light on this ship when he quirped: "It's a funny thing, this aviation business. It seems to travel in a circle. Here we are designing a plane that will fly slower than the first planes that were built, when engineers were worried because they couldn't fly fast enough."

Such was the general side of the picture the day Uncle Sam took delivery on the first of a new type, revolutionary design observation plane that may give rebirth to the old tactical unit—the observation squadron. But the technical side was just as interesting, for this YO-51 has some interesting features worth bringing to light.

The newest feature about the plane is the full-slotted wing which it incorporates to "cut down" speeds. The leading edge or front edge of the wing is separated into a lower and an upper leading edge. When the pilot wishes to slow down the ship he raises the upper leading edge of the plane (wing) which turns the front part of the wing into a trough, scooping against the air. At the same time there is released from within the rear part of the wing an extension which greatly adds to the wing surface.

This combination of wing flap and wing extension is the unique feature of the Ryan which army officials will not fully explain because it holds some confidential developmental secret. In operation, however, the "trailing edge flap" appears to come from within the wing itself and serve as an extension rather than just as a flap to "halt" the ship. The extension is so designed that it greatly increases the curvature of the airfoil, in this way increasing the ship's lift.

There is nothing released about how the operation is carried out, what mechanism is used, etc., other than the fact that it is done by a hand-crank located in the cabane section of the wing just above the pilot. Some sources say that the mechanism works by hydraulic pressure systems.

The pilot can manipulate the wing to cause the plane to "hover" slowly over a spot while the occupant of the rear seat takes observations.

Peculiar in design, the ship is externally braced and is built with the forward section made of steel tube construction and the rear section of semi-monocoque construction. The wind frame and leading edge back to the rear spar is of wood.

The trailing edge of the wing is covered with fabric. The wing is a strut-braced, two-spar, non-tapering design, two panels of which are pin-jointed to the cabane strut.

The entire upper surface of the wing and the lower surface to a point approximately eight inches back of the center line of the rear spar is covered with plywood. Built-up trussed wood ribs are used. The control surfaces are of aluminum alloy framework covered with fabric.

The tail assembly control surfaces are designed with "auxiliary rudders" attached to the elevators, another feature designed to decrease the ship's necessary flying speed.

The Ryan YO-51 is a single engined, high-wing monoplane. The pilot sits in the front pit and the observer in the rear. The ship is powered with one Pratt and Whitney 420 horsepower engine. Its gross weight is 3,200 pounds. It has a wing span of 52 feet.

"The purpose of this airplane," one army officer said, "is for short-range observation missions, assisting artillery by locating suitable objectives and adjusting fire, and for acting as liaison agent for ground commanders."

Ships of this type will be used to take the place of the sausage balloons that were used in the wartime. They may also supersede the autogyros.

Seven other companies have entered bids for the construction of this type airplane and will enter the competition at Wright Field.

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KIT NO. L 8

It's a WHIZ!

This month, Comet's Jubilee celebration brings TWO surprises instead of one! Just cast an eye over this 37-inch Lockheed Pursuit—accurately scaled down from the U. S. Army's fastest pursuit plane! Unusual design? You bet—and unusual value, too—because only Comet, anxious to give you even more for your money during this Jubilee Year, could bring you so much model-building satisfaction at only 50c! This is the ship which established a new cross-country record, whizzing across the continent in 7 hrs. 48 min., attaining a speed of 400 m.p.h. Two propellers, rubber motors enclosed in twin booms, tricycle shock-absorbing landing gear, and twin-rudders. And here's a tip, fellows—the unusual design of this ship makes it perfectly adaptable for an exceptionally good flying scale model!

COMET

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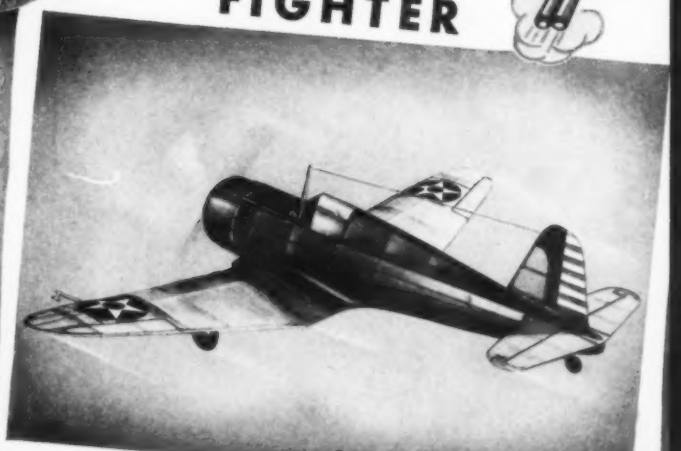
COMET *Jubilee* *Surprise* No. 6

The VOUGHT FIGHTER



33½"WINGSPAN

50¢

KIT NO. L 9

It's a WOW!

Working directly from authentic plans and official Army photographs, the Comet designing staff comes through with this swell model of the Vought Fighter, a fast military plane powered with a Twin Wasp double-banked engine. It's another typical Comet Jubilee Year value—a big 33½-inch wingspan model, with shock-absorbing landing gear and movable controls, for only 50c! The unusually complete kit includes finished turned cowling front, built-up engine, gun troughs and a finished propeller. Get one or both of these great new kits from your Comet dealer soon; add 15c postage if you must order direct.

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